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BIRTH INJURIES OF THE CORNEA AND ALLIED CONDITIONS*

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Most of the ocular injuries that occur during birth are the result of compression of the globe between the end of one maladjusted forceps blade and the roof of the orbit. While other parts of the eye are involved, we are particularly interest in the effects of birth injuries upon the cornea, which are quite characteristic. The abrupt folding of the cornea has a more serious effect upon Descemet's membrane, which usually shows a number of tears running up and down or crosswise, and more or less parallel with one another. These tears admit aqueous to the deeper layers of the cornea proper, accentuating the other results of wrinkling and pressure, and account for much of the permanent clouding found so regularly in the deeper corneal layers.

Like other injuries to Descemet's membrane, birth injuries do not heal over, they are visible by the aid of the slitlamp for years and are probably permanent.

In some of the cases reported, and in a very few examined under the microscope, the entire membrane was seen to have been stripped from the substantia propria, never becoming reattached. As this highly elastic membrane is stripped from its position, longitudinal tears separate it into several flat strips, each retaining its terminal attachments rather near the periphery of the cornea. The intermediate portion is now free in the aqueous, resembling the string of a bow. This condition was first reported by Peters, who examined the eye of a child who died 23 days after instrumental delivery. Microscopical examination also showed that each strip of detached Descemet's membrane curled up laterally, somewhat like a pretzel. He also found that the endothelium covered both surfaces of each strip, even insinuating its cells between the layers of the curled edges. The posterior corneal surface never regained a proper endothelial layer, but some attempt toward effecting this end was made. As was to be expected, the deeper corneal layers were much clouded. In ordinary tears of this membrane, there is always a tendency of the free edge to curl up.

The eyelid is usually interposed between the forceps blade and the cornea, but the point of maximum pressure is usually much clouded within a few hours of delivery. This cloudiness disappears within a few days and is replaced by the cloud in the deeper layers of the cornea, which is more lasting. Serious tropic damage is done the cornea, and this is manifested later by a keratoglobus or a very deep anterior chamber. High degrees of astigmatism with myopia are the necessary results of the corneal changes. It is a nice problem in some of these cases to decide whether it is a keratoglobus or a keratoconus with which one has to deal.

Although one would expect very defective vision to accompany marked cor-

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neal changes of the kind described, the amblyopia often runs much higher than the local changes would seem to justify, and one is compelled to say that, despite an apparently normal macular area, serious damage to the nervous tissue has been inflicted.

While injury by the forceps blade accounts for most of the cases reported, a few typical instances have been reported as occurring in spontaneous deliveries. Not all of the damage done during delivery is attributable to the forceps, for authentic cases of injury to the cornea have been caused by a deformed pelvis with a prominent sacral promontory.

If the forceps blade presses back the lid into the cul-de-sac above the globe, the stage is set for luxation of the globe with all its accompanying perils. I have seen two eyes luxated during delivery which, after replacement seemed to be entirely normal, but I have not had the privilege of examining these eyes after several years have elapsed, which is the only way to reach a reliable opinion as to whether the recovery was actual or only apparent. In one case, I have seen luxation of one eye and avulsion of the other. Tarnier axis-traction forceps were used and properly applied, but the pelvis was deformed and the eyes were scooped out as they passed over a very sharp and projecting promontory of the sacrum. The luxated eye was replaced, but the child passed from observation, and no later history could be obtained.

The type of birth injury characterized by glassy elastic rods of Descemet's membrane passing across the anterior chamber in the aqueous might be called type 1 of glass membranes of the anterior chamber. Type 2 might be described as the result of severe corneal inflammations commonly appearing as strands applied to the posterior corneal surface. A third type appears as the result of a protective measure exercised during ocular inflammations whereby injurious deposits are thrown against the posterior corneal surface. The second type is apparently the result of cracks in Descemet's membrane upon which fibrin collects and organizes. Lehman[1] has reported a large percentage of these injuries in a series of cases of interstitial keratitis. Ziporkes[2] has reported a most unusual case of this type in which the strands were free in the aqueous, in the form of a network such as might be found in persistent remains of the pupillary membrane, but without the color or the iris connections so characteristic of these remnants.

The third variety of glass membrane in the anterior chamber is found after a severe ocular inflammation characterized by deposits such as are found in tubercular uveitis; this has been called "posterior pannus."

Glass membranes free in the chamber must be differentiated from remains of the tunica vasculosa lentis attached to the posterior surface of the cornea. A formation of this type may be the result of a perforation of the cornea soon after birth, and for many years it was claimed that all such cases originated in this way. One very competent observer reports an anterior synechia forming under his eye with the adhesion finally seeming to rise from the lesser vascular circle of the iris. This last finding has been considered as positive proof of congenital or embryonic origin of these membranes.

As time has passed, cases with full history have been reported, and this group is now given the position of a distinct entity. These cases are all more or less similar, with definite features. Most of these eyes are microphthalmic and the deeper layers of the cornea over the place of attachment are clouded or even almost opaque. These bands have been observed soon after birth, and in some cases

have gradually disappeared spontaneously. Dr. E. M. Beery hastened to further this resorption by using atropine instillations, and the process went on to almost complete disappearance of the strands attached to the cornea. Other associated malformations in these cases have been anterior polar cataract, persistent hyaloid arteries, and pigment deposits upon both the cornea and the anterior surface of the lens. The last of these malformations are the natural result of delayed separation of the cornea from the tunica vasculosa lentis, and this delay is believed to follow delayed formation of the anterior chamber, which, in turn, suggests malformation of the angle of the chamber. Several cases of hydrophthalmos are included among the reported cases of this malformation. Another condition attributed to this late separation of the cornea from the tunica is the Krukenberg spindle.

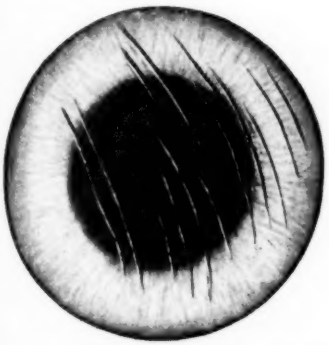

Fig. 1 (Lloyd). Male, aged 23 years. History of injury to left eye by forceps. Right eye normal; left vision 10/200. Iris of left eye is darker than that of the right; keratoglobus and deep anterior chamber. Fundus negative.

Case reports

Case 1. A male (fig. 1) of 23 years gave a history of instrumental delivery and poor vision in the left eye since birth. The right eye was normal; the vision of the left eye was 10/100 and could not be improved. Skiascopy of this eye showed seven diopters of myopic astigmia at axis 15 degrees. Ophthalmometer reading was 4.75 D. at axis 30 degrees. The anterior chamber of the left eye was deeper than that of the right eye, the left iris a darker green than its fellow, but both pupils responded promptly. Considering the number of tears in Descemet's membrane, the view of the fundus was excellent and nothing abnormal could be found in it.

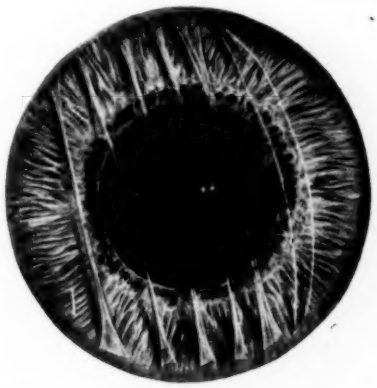

Fig. 2 (Lloyd). Male, aged 18 years, forceps delivery. Right eye, normal vision with —1 D. sph. ⊂ —.50 D. cyl. ax. 180°; left eye, vision 2/200, no improvement. Deeper layers of the cornea are very cloudy. All strands except the first are free in the anterior chamber. Pigmented deposits on the right cornea and two strands of persistent pupillary membrane cross the chamber from the pupillary margin above and laterally to a similar point below—one on each side of the pupil.

Case 2. A male (fig. 2), now 18 years old, had been delivered instrumentally. The right eye had normal vision, with a low minus spherical and cylindrical correction. The vision of the left eye was 2/200 and could not be improved. Skiascopy could be done on this eye, but the ophthalmometer showed six diopters of astigmatism at axis 95 degrees. There

were seven strands of glassy material running from above downward; of these the six nasal strips were free in the aqueous but were attached at each end to the posterior corneal surface near the periphery. The first strand on the temporal

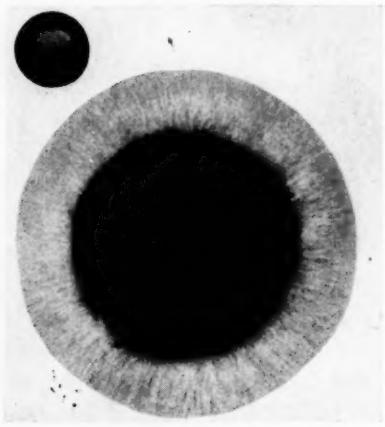

Fig. 3 (Lloyd). Spontaneous delivery. Twenty-five diopters of myopia. Myopic changes in the fundus. Cornea white for a year after birth.

side was applied closely to the posterior corneal surface. The deeper corneal layers were quite cloudy. There were a number of red-brown dots on the posterior corneal surface of the right eye, and two strands of persistent pupillary membrane ran from above downward but attached to the iris at the lesser circle above and below. In the left eye, the view of the fundus was very much blurred.

Case 3. A male (fig. 3) of 11 years had a history of spontaneous birth before assistance of any kind arrived. With the right eye he read 20/20 with the correction of a —1.00 D. sph. The left eye had light perception only, and with —25. D. sph. in the ophthalmoscope a fair view of the fundus was obtained, showing the disc set at a sharp angle with typical myopic changes involving the macula. The cornea of the left eye was larger than that of the right, and its chamber deeper. The horizontal measurements of the corneas were right eye 11 and left eye 13 mm.; the vertical measurements 12 and 13 mm., respectively. The cornea of the left eye was white for almost a year after birth, but it became steadily clearer and is but lightly clouded now. There were a number of tears in Descemet's membrane running from above downward and inward and more or less parallel to each other. It is not certain that this was a case of birth injury, but similar findings have been reported in spontaneous births.

Case 4. A girl, six years old, had normal vision in the right eye with a correcting sphere of + 1 diopter. The left eye had been injured during instrumental delivery. The vision of this eye at this age was 10/200 without improvement, but seven years later it was 10/70. The skiascopy under atropine at the age of six years was —5.00 D. sph. ⊂⊃ —8.00 D. cyl. ax. 180°. Seven years later it was —4.00 D. sph. ⊂⊃ —2.00 D. cyl. ax. 180°, but in neither case

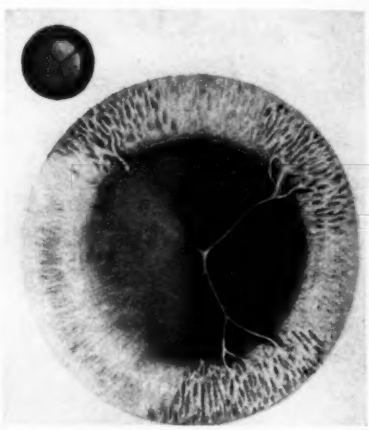

Fig. 4 (Lloyd). Remains of pupillary membrane adherent to the cornea. Microphthalmic eye.

was the vision improved by the glass.

Case 5. A girl of eight years (fig. 4) read 20/20 with the left eye when wearing + .50 D. sph. ⊂⊃ + .50 D. cyl. ax. 180°. With the right eye, a typical microphthalmic eye, she could count fingers at three

feet. The horizontal measurements of the two corneas were 8 and 9 mm., respectively, and the vertical, 9 and 11 mm. The lower outer quadrant of the right cornea was clouded and almost opaque with a superficial layer of tissue like the sclera, and continuous therewith. The deeper corneal layers were very cloudy, especially near the center of the cornea, where three fibers of the same color as the iris converged and were attached. The upper and inner branch and the lower arm of the Y-shaped remnant arose from the lesser circle of the iris. The other member was more nearly horizontal, and was lost in a pigment patch on the posterior surface of the cornea near the limbus. This arm was in contact with the posterior corneal surface, and beneath its extremity a bit of iris tissue projected from the iris toward the cornea as if it had been the original attachment of this part of the remnant. There was a very large persistent hyaloid artery extending to and attached to the posterior lens surface internal to and a little below the posterior pole. Its posterior extremity could be traced to the disc. On the anterior surface of the lens were a number of bits of pigment in the form of triradiate brown lines.

Case 6. This patient (fig. 5) had a glass membrane on the posterior surface of the left cornea, which developed during the course of a sharp tuberculous uveitis at the age of 15. The slitlamp was not in use when this case was under treatment, but eight years later, during the course of an eye examination, this peculiar formation was found, and it remained in its original form seven years after its discovery. At the lower angle of the anterior chamber there was a mass of almost transparent tissue from which radiated three branches to end in sucker-like expansions about half way to the undilated pupil margin. It was plainly vascular in nature, and evidently served as a protective measure against the pernicious effects of the deposits which were thrown against this surface during a period of eight months. The term posterior pannus has been suggested for this type of glass membrane, and it is certainly a most appropriate one.

Fig. 5 (Lloyd). Formation developed on posterior surface of cornea during tuberculous iridocyclitis eight years before.

Dr. Ziporkes[2] reported a most interesting and unique case of glass membrane in the anterior chamber, with illustration. The network was free in the anterior chamber, and there was no connection with the iris. It was attached to the posterior surface of the cornea by terminals of the same size and shape as the remainder of the structure. The patient suffered a series of relapsing corneal ulcers, and Dr. Ziporkes believed this network to be an organized fibrinous exudate upon which the endothelium had grown to form a permanent structure. I have found no parallel case in the literature.

Comment

It is worth noting that in the birth-injury cases the left eye has been involved in every patient comprising this group. This is to be expected because of the preponderance of left occipito-anterior presentations, which bring the left eye to the rear.

The case in which the remnants of the pupillary membrane were attached to the posterior corneal surface is a microphthalmic eye, as the literature indicates it should be. Other malformations were associated as should be expected. The pigment on the posterior corneal surface and that on the anterior surface of the lens with the remnants running from the iris to the cornea are all explainable as the result of late separation of the cornea from the tunica vasculosa lentis. From a study of similar cases recorded in the literature, this is, in turn, the result of delayed formation of the anterior chamber, which should turn our attention to the association of hydrophthalmus, and allied conditions, as a logical sequence to be expected in a certain proportion of cases.

Bibliography

Brückner's[3] classic description of the various types of pupillary-membrane remnants will be found in the Archiv für Augenheilkunde. Peters's[4] description of the formation of strips of Descemet's membrane running across the anterior chamber and the subsequent curling-up of the lateral margins of each strip will be found in the same journal, page 311, under the title "Eine Verletzung der Hornhaut durch Zangenentbindung mit anatomischem Befund." The best article on birth injuries of the eye is by Thomson and Buchanan.[5]

The fourth and sixth cases of this group are taken from my private practice. The other four cases reported are from Dr. Hargitt's clinic at the Brooklyn Eye and Ear Hospital, and I would like to thank him for the privilege of studying and reporting this material; also Dr. Alan Hull for finding and referring cases 1 and 5, and Dr. Joseph Bruno for the same kind service in connection with cases 2 and 3.

References

[1] Lehman. Zeit. f. Augenh., 1927, v. 62, p. 230.
[2] Ziporkes. Arch. of Ophth., 1933, v. 10.
[3] Brückner. Arch. f. Augenh., 1907, v. 56, supplement, pp. 5-149.
[4] Peters. Arch. f. Augenh., 1907, v. 56, p. 311.
[5] Thomson and Buchanan. Trans. Ophth. Soc. U. Kingdom, 1903, v. 23, p. 296.

Discussion

Dr. Theodore L. Terry, Boston: In 1926, before the Ophthalmological Society of the United Kingdom, Ballantyne reported a case of detachment of Descemet's membrane resulting from a birth injury inflicted by the forceps. He was able to examine the eye again when the child was five years of age. By oblique illumination he found a somewhat crescentic figure in the upper portion of the cornea. The upper line was somewhat serrated, whereas the lower line formed a gentle curve. With the slitlamp he discovered an apronlike detachment of Descemet's membrane, the upper wavy line being the base and the lower curved line being the free edge. In the beam of the slitlamp at the lower edge of the detachment there was a bright, expanded bead. The shape of this detachment, no doubt, prevented extensive rolling-up of Descemet's membrane into a rod, as Dr. Lloyd has observed.

At the Massachusetts Eye and Ear Infirmary laboratory there are sections of just such an eye. The original central core

of Descemet's membrane hangs down into the anterior chamber, on which there are several newly deposited layers of Descemet's membrane. Since the free edge of the membrane has rolled somewhat, the newly formed Descemet's membrane covers over this roll, producing a nodular extremity. Such an extremity would give the appearance of a bright bead in the beam of the slitlamp. Presumably, the layers of the newly formed Descemet's membrane are due to repeated loss and regrowth of endothelium. This patient noticed slight irritation and redness of the eye at the age of twenty-one. She consulted Dr. Verhoeff, who observed recurring attacks of bullous keratitis. There was no history of birth injury or trauma to the eye. Finally, she developed glaucoma, and since the vision had always been very poor, the eye was removed.

Dr. John Green, St. Louis: I have not had the opportunity of seeing any of the more severe forms of corneal injury from forceps. I have followed one patient from the day of birth to the age of twenty. The first appearance of the eye is very striking. The cornea is porcelain-white, and totally obscures the pupil and iris. Under dionin and hot packs the cornea soon begins to clear, and ultimately may show no macroscopic traces of the injury. In my experience these patients always present vertical striations on Descemet's membrane. In the less severe cases the vision, in later life, is not greatly impaired. The particular patient discussed has a high mixed astigmatism (—2.00 D. sph. ⊂⊃ +7.00 D. cyl. ax. 108°) with V. = 6/12. The fellow-eye has +1.25 hyperopia. This correction is worn with satisfaction.

THE PROBLEM OF OCULAR TUBERCULOSIS*

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Ocular tuberculosis presents both a diagnostic and a therapeutic problem. The diagnostic problem centers on those forms of ocular tuberculosis which present nothing in the clinical picture characteristic of the underlying disease. The therapeutic problem is governed and complicated by the pathogenesis of tuberculosis —the factors which influence the course and character of the lesions. Differences of opinion on these subjects are responsible for much of the confusion in the minds of many ophthalmologists and internists. It is the purpose of this paper to review these different phases in the light of past and recent investigations.

THE DIAGNOSTIC PROBLEM

Certain forms of ocular tuberculosis, notably those with visible tubercles, are recognized and agreed on by both ophthalmologists and tuberculographers. These typical forms are comparatively rare. More frequently, the diagnosis of ocular tuberculosis is made in ocular inflammations which show nothing in the clinical picture indicative of the underlying pathology of tuberculosis. In these cases the diagnosis is frequently greeted with skepticism by internists and tuberculographers, who pointedly inquire how such a diagnosis may be reached in patients who show no other physical evidence of tuberculosis, and only a tuberculin hypersensitivity of varying degree. In the absence of tissue available for biopsy, of fluids to examine for bacilli, and with other known etiological agents capable of evoking similar eye lesions, the difficulties of diagnosis are manifest. Except in the typical cases, the diagnosis of ocular tuberculosis must be made on four criteria: 1. The character and course of the eye lesion, and the correlation of this with other similar lesions previously shown to be tuberculous by histological examination. 2. The exclusion of other possible etiological factors. 3. A study of the general tuberculous status of the patient. 4. The reaction of the patient to tuberculin. These four points will be taken up in order.

The character and course of ocular tuberculosis. The clinical-pathological correlation. It is unnecessary in this discussion to go into the details of the symptomatology and pathology of ocular tuberculosis, which have been abundantly and adequately covered in many other articles and monographs. Only certain features concerning the diversity of tuberculous ocular lesions and their varied course need to be stressed here.

Tuberculosis may affect any structure of the eye. Since the tubercle bacillus has a special predilection for vascular and connective tissue, the initial point of infection is usually in the uveal tract. From the uvea bacilli may disseminate to the cornea, sclera, or retina. Corneal tuberculosis is probably most often secondary to a ciliary tubercle rupturing into Schlemm's canal; the bacilli seed out from there, and the first infiltrates usually appear near the limbus. Only rarely do these infiltrates break down and ulcerate.

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* From the Wilmer Ophthalmological Institute of the Johns Hopkins University and Hospital. Read before the Inter-State Postgraduate Medical Association of North America, at Saint Louis, Missouri, October 19, 1937, under the auspices of the Schneider Eye Research Foundation, and before the Ophthalmological Section of the Saint Louis Medical Society, October, 1937.

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Except for the usual marginal distribution of the early infiltrates, there is little in the clinical picture to suggest tuberculosis. Histologically, definite tubercles are found in the corneal stroma. This type of corneal tuberculosis is characterized by the self-limited but recurrent attacks, and the peripheral corneal scarring. More rarely corneal tuberculosis appears as a deep central infiltrate. This type Rollet and Colrat[1] believe secondary to bacilli from the aqueous.

Tuberculous iritis may appear either as a classical nodular iritis, with hard miliary tubercles over the surface of the iris, or as an entirely noncharacteristic exudative or serous iritis. This latter type has a tendency to self-limited attacks and recurrence. Occasionally an attack may be complicated by the evanescent Koeppe nodules, which are of significant diagnostic importance. Verhoeff[2] has demonstrated histologically actual tubercles in this form of iritis. Tuberculomas of the iris are devastating, caseating, necrotizing tumors which quickly perforate the globe.

Deep scleritis is a rather characteristic tuberculous lesion. The attacks are usually of long duration, and there is a definite tendency of the disease to spread and to recur. Weakening of the sclera and ectasia are frequent in the latter stages. Histologically, tubercles are found throughout the affected sclera.

Tuberculosis of the choroid appears in a number of forms. Probably the most frequent type is the central circumscribed exudative choroiditis, with exudates near or at the macula. In healing, these lesions leave a central scar and pigment heaping. There is a marked tendency to recurrences, and in old cases one frequently finds the overlapping scars of former attacks. On the other hand, tuberculous choroiditis may appear as a spreading, devastating lesion, with rapid involvement of the retina and loss of vision. Especially in younger individuals the inflammation may involve the entire uvea, caseation and necrosis occur, and the eyes finally perforate. Tuberculomas of the posterior segment usually perforate quickly. Solitary tubercles of the choroid, with their surrounding zone of hemorrhage, present a characteristic picture. Miliary tubercles of the choroid are usually a terminal affair and likewise present a typical appearance.

The retina may be involved from the spread of choroidal tuberculosis and be destroyed rapidly. A rather characteristic disease is retinal periphlebitis, with the recurrent retinal and vitreous hemorrhages. This disease usually occurs in late adolescence. Finnoff[3] believed it secondary to rupture of a ciliary tubercle in the posterior chamber.

It is therefore apparent that ocular tuberculosis may appear in widely different forms and pursue radically different clinical courses. First, we have the characteristic lesions, such as nodular iritis, tuberculomas of the anterior and posterior uvea, and miliary tubercles of the choroid. Second, there is a distinct group of tuberculous lesions, involving the cornea, iris, or choroid, characterized by the self-limitation of the attack, the tendency to recurrence, and a lack of symptomatology indicative of the presence of tuberculosis. Finally, there is a group of rapidly progressive, exudative, caseating lesions, especially of the uvea, which rapidly destroy the eye. Except for the destructive caseation, there is nothing in the clinical appearance of the last group to indicate tuberculosis. The last two groups, with little in the clinical picture to suggest tuberculosis, present the serious diagnostic problem. What reason is there to believe they are tuberculous in origin? The reason for such a belief is, first, that similar lesions have been produced experimentally in animals by the

injection of tubercle bacilli, and, second, that in a number of instances histological examination of human eyes with similar lesions have shown them to be tuberculous.

Studies on experimental ocular tuberculosis by Stock[4] in 1907, and later by Rollet and Aurand,[5] LaGrange,[6] Montalti,[7] Samoilov,[8] and numerous others have demonstrated that when the normal eye is inoculated with tubercle bacilli by intraocular or, at times, by intracarotid injection, there first results a slowly progressive ocular tuberculosis with tubercle formation. Depending on the number and virulence of the injected organisms, these lesions may heal and leave only indifferent scarring, or they may progress with intense inflammation; exudation may ensue, masking all evidence of the tuberculous origin of the inflammation; and still later the eyes may caseate and perforate. On the other hand, if systemically infected animals are reinoculated by intraocular or intracarotid injection, the course of the inflammation is usually quite different from the onset. Instead of a slowly progressive ocular tuberculosis with tubercle formation, the eyes usually react with an intense exudative inflammation, presenting nothing characteristic or suggestive of tuberculosis. Thereafter the eyes may heal, and recurrences may or may not occur; or they may caseate and perforate, depending on the number and virulence of the inoculated bacilli and the resistance of the animal. The observations on experimental ocular tuberculosis in the Wilmer Institute for the last two years have abundantly confirmed these findings. The pertinent point to this discussion is that experimental tuberculous lesions of the eye, under certain conditions, may be entirely noncharacteristic in their appearance, and may closely simulate the self-limiting, recurrent lesions, and the wide-spreading, caseating inflammations observed in human eyes.

The amount of human anatomic material from these noncharacteristic ocular inflammations is somewhat limited, for unfortunately these eyes only rarely can be obtained for histological study. There may be reasons to excise a portion of the inflamed iris; or the disease may progress until vision is destroyed and the eye is enucleated for pain or a secondary glaucoma. A few patients have died from some intercurrent infection and the eyes were obtained at autopsy. There are a few cases in which such eyes have been enucleated on a mistaken diagnosis of intraocular tumor. The accumulation of this pathologic material for correlation with the known clinical picture is manifestly slow and laborious. There is, however, a certain amount of material. Isolated cases have been reported by O'Gilvy,[9] Finnoff, and others. Verhoeff has collected anatomic specimens from seven patients with clinically noncharacteristic iritis and choroiditis and has demonstrated the essential tuberculous nature of the disease in each instance. He concluded that all cases of localized exudative choroiditis are tuberculous, excluding, of course, the possibility of syphilis. In the Wilmer Institute 12 eyes have been enucleated which show histologically demonstrable tuberculosis. The clinical eye lesion in two of the patients was frankly tuberculous, but in the other ten the clinical picture showed nothing characteristic. In six of these ten patients a clinical diagnosis of ocular tuberculosis had been made, but in four the tuberculous etiology was recognized only on histological study.

In 1933 Igersheimer[10] collected from the literature 67 cases of histologically examined uveal tuberculosis and added 15 cases of his own. From a study of this material he divided ocular tuberculosis into three general clinical-histological

groups, as follows: *A.* Acute, steadily progressing uveal inflammations, occurring principally in individuals under twenty years of age, usually affecting only one eye, progressing without remission for months, at most a year, and finally terminating in cure or enucleation. Histologically, these cases show characteristic tubercles, with lymphocytes, monocytes, and plasma cells; and bacilli can frequently be demonstrated. The more acute the process the more marked is caseation and the tendency to perforation. *B.* Chronic, recurrent types, usually occurring in adults and affecting both eyes. Histologically, typical epithelioid-cell tubercles are not regularly found, caseation and perforation of the eye are extremely rare, and tubercle bacilli cannot, as a rule, be demonstrated. While these eyes may not show typical tubercles, in the deeper parts of the eye are small, hidden nests of epithelioid cells. Other rare cases may show only nonspecific scarring. Should scarring only be present, a combination of the clinical and pathological study is necessary for the correct diagnosis. *C.* Rare cases, characterized by intense inflammation with early spread of the inflammatory process to the vitreous and deep structures of the eye, and rapid loss of vision. Histologically, such cases show characteristic lesions with extensive infiltration by lymphocytes and epithelioid cells, and tissue necrosis. Occasionally the necrosis is limited to the retina, and in a few cases a peculiar layer of epithelioid and giant cells is formed between the retina and choroid, associated with necrosis on the surface.

Urbanek[11] and Eggston[12] have attempted to differentiate ocular inflammation caused by tubercle bacilli, and allergic inflammatory reactions in the eye secondary to general tuberculous infections. This differentiation appears artificial. Many tuberculous eyes may show a sudden transitory increase in the inflammatory reaction associated with a sudden change in the skin-reactivity to tuberculin, and the cause of these acute evanescent reactions is probably an allergic reaction due to some change in the patient's general tuberculous status, or to an excessive dose of tuberculin. There is certainly no valid clinical or experimental evidence to indicate that allergic tuberculous reactions can occur in the human without actual infection of the eye by tubercle bacilli at some time.

The exclusion of other etiological factors. Endogenous intraocular inflammatory disease of the general type under discussion may be caused by a variety of etiological factors—tuberculosis, syphilis, inflammation secondary to systemic disease or to foci of infection, or perhaps caused in some instances by filterable viruses.

Syphilitic lesions may closely simulate tuberculous lesions in the eye. However, with the exception of the interstitial keratitis of congenital syphilis, where other stigmata of congenital syphilis are usually found, patients with inflammatory syphilitic disease usually have a positive Wassermann reaction. On this basis syphilis can usually be easily excluded.

Routine medical examination will usually confirm or rule out systemic disease as the etiological agent. Focal infection presents a much more difficult problem. The majority of individuals, both healthy and diseased, harbor some pet focus of infection—be it periapically infected teeth, chronically infected tonsils, a chronic sinusitis, an old infection of the genito-urinary tract, or what not—to which they are inordinately attached. In the diagnosis of the etiology of a nonspecific inflammatory ocular lesion, because of the relationship between such eye lesions and focal infection, a careful search

must be made for foci of infection; they must be eradicated as far as possible, and the effect of such eradication on the activity and course of the ocular lesion observed. From the behavior of the eye lesion after eradication of the known foci of infection, the ophthalmologist must decide if the ocular lesion should be attributed to focal infection, or if tuberculosis must be considered as a possible etiological factor.

The general tuberculous status of the patient. A study of the general tuberculous status of a patient with suspected ocular tuberculosis may reveal information of diagnostic significance. It is well recognized by tuberculographers that sanitoria patients with open pulmonary tuberculosis rarely show frank ocular tuberculosis. Groenouw[13] quotes Rakitansky as finding no instance of ocular tuberculosis in 14,000 sanitoria patients. Witkina and Maklakova,[14] in 1926 report that in the 19,000 patients in various sanitoria about Leningrad there were only two cases of ocular tuberculosis. DeBenedetti[15] in 1930 reports from the Institute of Phthisiology at Milan that among 21,293 patients with pulmonary tuberculosis there were only four cases of eye tuberculosis. Löwenstein[16] reports that in his 20 years' experience, a study of 40,000 sanatoria patients with severe pulmonary tuberculosis has shown an incidence of ocular tuberculosis of only 0.1 percent. Whether these authors considered only the devastating, inflammatory, perforating types of ocular tuberculosis, and not the clinically nonspecific ocular lesions, is not clear. More accurate figures are available from the reports of ophthalmologists who have routinely examined the eyes of tuberculous patients in sanatoria. The combined reports of Denig,[17] Glover,[18] and Goldenburg and Fabricant[19] list 1,793 patients with pulmonary tuberculosis of whom 25, or 1.5 percent, showed ocular lesions the examining ophthalmologist believed to be tuberculous. These studies indicate the infrequency of tuberculous eye lesions in patients with frank pulmonary tuberculosis. The incidence of eye tuberculosis in patients with tuberculosis of the bone or urogenital system appears somewhat higher. Rohrschneider[20] examined 181 such patients and found 17, or 7 percent, with eye lesions he believed tuberculous.

However, the crux of the question is not how may people with pulmonary or other tuberculosis develop secondary eye lesions, but the location of the primary tuberculous source whence the eye infection may arise. It is obvious that tuberculous lesions arising in the vascular uveal tract of the eye, with an intact globe and unbroken corneal epithelium, must be hematogenous in origin. Werdenberg[21] has perhaps studied this question more extensively than others. While his conclusions do not meet with universal acceptance, they are none the less interesting. In his most recent paper he reports a full clinical and X-ray study of approximately 500 eye tuberculosis patients at Davos, Switzerland. He believes the primary tuberculous focus is always intrathoracic, in the lungs or hilus glands. Sixty percent of his patients showed what he termed slight intrathoracic changes, with no physical evidence of pulmonary tuberculosis, but on careful X-ray examination showed slight shadows in the hilus region with slight dissemination of the lesion in the lower fields. Thirty percent showed more advanced X-ray evidence of pulmonary tuberculosis with heavy hilus shadows, infiltration from the hilus glands, not only to the lower fields but also to the apices, with pleuritic fibrous adhesions. This group of patients, however, showed no evidence of pulmonary tuberculosis on physical examination. The third group comprised the remaining 10

percent, and showed advanced pulmonary lesions often with early cavity formation and pneumothorax, with definite physical signs of pulmonary tuberculosis.

Werdenberg further found a rather definite correlation between the severity of the eye lesions and the degree of the pulmonary lesion. His 500 ocular tuberculosis patients fell into three general groups. The first group, comprising 60 percent of the total number, showed severe eye lesions and slight pulmonary changes, and was termed by him "normal." The second group, 10 percent of the whole, was termed "inverse" and showed slight eye lesions and severe pulmonary lesions. The third group, the remaining 30 percent, showed "parallelism," with moderately severe eye and pulmonary tuberculosis. In the extremely severe exudative and inflammatory eye lesions, fever and evidence of toxemia were more frequent than in the more benign types of ocular tuberculosis.

Grönholm[22] made a similar study of 100 patients with ocular tuberculosis, and found clinical and X-ray evidence of an old or active pulmonary tuberculosis in 18 patients, and X-ray evidence of hilus-gland tuberculosis in 55 patients. A recent analysis in the Wilmer Institute of 138 private and dispensary patients with clinical ocular tuberculosis, and the 12 patients with histologically proved ocular tuberculosis shows that of these 150 patients, 26, or 17 percent, had either clinical or radiographic evidence of active systemic tuberculosis. Only 13 of these patients showed physical signs of tuberculosis, and 137 were negative to routine physical examination. Roentgen-ray examinations were made on 80 of these 150 patients, including 10 of the patients with clinical evidence of systemic tuberculosis. Twenty-three, or 28.7 percent of the plates, showed evidence of old intrathoracic tuberculosis (table 1). The incidence of demonstrable systemic tuberculosis was much higher in the private patients than in the dispensary group, 55.5 percent against 10.5 percent, illustrating probably the greater opportunity for exhaustive study in the former groups. A comparison of our figures with those of Werdenberg indicates the probability that many pictures interpreted by Werdenberg as showing slight tubercular changes would be read as normal by American radiologists. Krückmann[23] studied the relation of eye tuberculosis to general systemic tuberculosis and was successful in following three of his patients to autopsy, death being due to causes other than tuberculosis. Histologic examination of the eyes confirmed the diagnosis of ocular tuberculosis. Each of these patients showed tuberculosis of the hilus glands with caseous peribronchial glands, but on exhaustive study there was no tuberculosis of the lungs or other structures. Krückmann was convinced that ocular tuberculosis is usually secondary to hilus-gland tuberculosis, the peribronchial glands becoming infected directly from an old tuberculosis of the upper lobes, or indirectly by tuberculosis relayed by the lympho-glandular pathway. This glandular depot is capable of disseminating infection after the primary focus has healed. One patient in our series came to autopsy. This was a negro

TABLE 1

GENERAL TUBERCULOUS STATUS OF OCULAR TUBERCULOSIS PATIENTS

Systemic Tuberculosis	Physical Examination 150 Patients	Roentgen-Ray Photos of Chests of 80 Patients
Active intrathoracic tuberculosis	1	1
Healed intrathoracic tuberculosis	9	22
Other systemic tuberculosis	3	0
Total	13 or 8.7%	23 or 28.7%

infant with a perforated tuberculous lesion of the eye. General autopsy showed caseous mediastinal glands and a diffuse miliary tuberculosis.

The united opinion appears to be that ocular tuberculosis is secondary to remote tuberculous foci, usually in the peribronchial glands. The mode of infection of the eyes is obviously through a transient bacillemia. Rohrschneider emphasizes that all clinical evidence indicates that this bacillemia must be slight, and that the ocular metastases are not caused by the flooding of the blood with large amounts of bacilli. The localization of the bacilli in the eyes is largely accidental, although the greater occurrence of tuberculosis in the right eye is due to the peculiarity in the circulation. Löwenstein explains the frequent bilateral eye involvement on the grounds of organotropism, and cites the frequency of bilateral renal tuberculosis as an example. Both Löwenstein and Riehm[24] believe there is an elective sensitization of the eyes, somewhat similar to sympathetic ophthalmia, and Riehm cites interesting experiments in ocular allergy indicating such elective sensitization of the eyes to be a possibility. Grönholm sums up the situation well when he says "ocular tuberculosis generally attacks apparently normal, healthy, vigorously built, and well-nourished individuals with an abated, healed, or at any rate fairly benign tuberculosis in some organ, most frequently the lymphatic vascular apparatus, more rarely the lungs; whereas it never occurs in active malignant tuberculosis." However, careful clinical and roentgen-ray examination of the chest is of the highest importance in the diagnosis of ocular tuberculosis, and in the absence of other manifest causes for the eye lesion, the demonstration of an old or active pulmonary lesion, or increased hilus shadow in the chest plate, makes more probable the final diagnosis.

The tuberculin reaction. The skin-reactivity to tuberculin of patients with ocular tuberculosis must be determined by the Mantoux or intracutaneous test, in order to avoid the danger of focal reaction in the eye, incident to the subcutaneous and Calmette tests. The von Pirquet test is too delicate to be of value in patients other than infants. The Mantoux test consists in the intracutaneous injection on the forearm of graduated amounts of old tuberculin, 0.001, 0.01, and 0.1 mg. The reactions are read at the end of 48 hours, and give an accurate estimation of the degree of skin-reactivity present. Much has been written for and against the diagnostic value of this reaction. Hart's[25] figures give a good idea of its value in pulmonary tuberculosis. He tested 1,030 patients with clinical systemic tuberculosis and found 13 percent were negative to 0.01 mg. and 3.7 percent negative to 0.1 mg. These last patients were then tested with 10 and 100 milligrams, and 2.2 percent were still negative to these large doses.

Our experiences in the Wilmer Institute with the Mantoux test in ocular tuberclosis are even more disappointing. An analysis of the tuberculin reactions of 180 patients diagnosed as having ocular tuberculosis in the Wilmer Institute (table 2) shows that 96, or 53.4 percent, reacted to 0.001 mg.; 75, or 41.6 percent, reacted to 0.01 mg.; and 9, or 5.0 percent, reacted only to 0.1 mg., or were insensitive. Inasmuch as the greater number of supposedly normal individuals react to 0.1 mg. and many normals show moderate reactions to 0.01 mg. the diagnostic unreliability of the Mantoux test is apparent. It is possible that in some of these 180 patients with supposed ocular tuberculosis, the diagnosis may be erroneous. Yet when the skin-reactivity of patients with proved histologic ocular tuberculosis

TABLE 2

TUBERCULIN HYPERSENSITIVITY OF OCULAR TUBERCULOSIS PATIENTS

Class of Patients	No.	Sensitive to 0.001 mg.	Sensitive to 0.01 mg.	Sensitive to 0.1 mg. or less
Clinical ocular tuberculosis	180	96 or 53.4%	75 or 41.6%	9 or 5%
Histologically proved ocular tuberculosis	10	6 or 60%	2 or 20%	2 or 20%

is studied, the same wide difference is still present. Friedenwald and Dessoff[26] compared the results of the Mantoux test in patients with histologically proved tuberculosis and in patients with proved nontuberculous lesions. Of ten patients with proved ocular tuberculosis, six had shown positive skin reactions to 0.001 mg.; two had shown positive reactions to 0.01 mg.; one patient to 0.1 mg.; and one had reacted only to 1.0 mg. Of thirty-six patients with histologically proved nontuberculous eye lesions, only five reacted to 0.001 mg., and the reactions in the other thirty-one varied from 0.01 mg. to tuberculin insensitivity. They concluded that the absence of sensitivity to large doses does not rule out the possibility of ocular tuberculosis, that patients with tuberculous eye disease may be insensitive to such dosage.

On the basis of these results it is apparent that there is no basis for the older view that a high degree of skin-reactivity will be shown by patients with ocular tuberculosis, while a low degree of skin-reactivity is positive evidence against the eye lesions being tuberculous. All that can be said is that a high degree of skin-reactivity to 0.001 mg. suggests that the eye lesion may be tuberculous, but negative reactions to 0.001 mg. or to weaker doses are utterly without diagnostic value in the determination of the tuberculous nature of a suspected eye lesion.

Other investigators have reached the same general conclusion. Braun[27] tested 200 patients diagnosed as having ocular tuberculosis, compared the results with an equal number of controls, and found the skin-reactivity was only 20 percent higher in the patients with ocular tuberculosis. Hrankovicova[28] found only 75 strongly positive tests in 214 patients, and Biozzi[29] found only 19 strongly positive reactions in 70 patients. Urbanek[30] attempted to classify the positive and negative Mantoux reactions he observed in patients with ocular tuberculosis and concluded that a negative or weak reaction indicated either a spreading, probably general, lesion with toxemia and exhaustion of the available antibody, or the encapsulation of the lesion and destruction of the bacteria.

In view of the highly doubtful value of the intracutaneous tuberculin reaction, other diagnostic laboratory tests have been tried on patients with ocular tuberculosis. Bencini,[31] Malek and Rumora,[32] Tiedemann,[33] Takagi,[34] and others have used the Löwenstein technique in the effort to cultivate tubercule bacilli from the blood of patients. Even with this delicate and unreliable technique only rarely have positive results been obtained. The complement-fixation reaction against various antigens derived from the tubercle bacilli has been employed by Biozzi, Rohrschneider, Bachmann,[35] Carrere,[36] Hambresin and Besseman,[37] Valtis,[38] and others. The general conclusion is that the reaction is of no value. Biozzi's figures are typical—only 19 out of 70 patients with various forms of ocular tuberculosis giving a positive reaction.

Changes in the blood picture, in the sedimentation of the red blood cells, and changes in the leucocyte and lymphocyte ratio have been studied by Fontana,[39] Velez, Rossi,[40] Tertsch,[41] and others. Occasionally some changes have been found to which diagnostic significance has been attributed, but in general the results were negative. Animal inoculation of the aqueous withdrawn from suspected eyes has been repeatedly attempted. The results are uniformly negative, as might be expected, for unless a tubercle ruptures into the anterior or posterior chamber there would be no reason to suspect tubercle bacilli in the aqueous. Caramazza[42] has, however, recently reported the injection of the aqueous of a suspected case of anterior tuberculous uveitis into the peribronchial lymph nodes of a guinea pig. These nodes were later excised, emulsified, and injected into the peribronchial lymph nodes of a second pig. In the lymph glands of several pigs he later observed changes he believed to be tuberculous. In general, however, efforts to establish tests of diagnostic importance in ocular tuberculosis have been fruitless. The tests employed have either been valueless or impracticable.

It is obvious, therefore, that in the majority of instances, when the ocular lesions are noncharacteristic, the final diagnosis of ocular tuberculosis is often only a presumptive, tentative diagnosis. It is based on a study of the character and course of the lesion, the knowledge that many similar lesions have been proved tuberculous by histological examination, and the exclusion as far as possible of other etiological factors. It may or may not be reinforced by the demonstration of a tuberculous focus from which the infection might emanate, or by the presence of a high degree of tuberculin hypersensitivity. The subsequent course of the lesion and its behavior under specific therapy may confirm our diagnosis, but in many cases the lesion may heal or the eye be utterly lost and the correctness of the original diagnosis still be doubtful.

When a diagnosis of ocular tuberculosis has finally been made by the opththalmologist, what is the proper therapeutic attack on the disease?

The therapeutic problem

The local measures to control ocular inflammation have little effect on tuberculosis. The indications for mydriatics, miotics, heat, and subconjunctival injections are well agreed upon. General nonspecific protein therapy, induced hyperpyrexia, and climatic treatment are of little if any benefit. Direct chemo-therapeutic attack on the tubercle bacilli has not been successful. The intravenous use of colloid of gold has not met with wide acceptance and has certain dangers. Phototherapy has a limited application, and the use of X-rays or the hard gamma rays of radium at times may produce serious activation of the eye lesion. Since there is no direct therapy against the bacilli, the attack must therefore be to remove the factors which accelerate the spread of the lesion and to promote the factors which influence the encapsulation of the lesion and the destruction of the bacilli. What are the factors which promote acute inflammation and spread of the lesion, with caseation and necrosis, or determine limitation of the lesion with encapsulation and healing? The investigations on the pathogenesis of tuberculosis have thrown much light on this question.

Since the time of Koch it has been recognized that under parallel conditions and proper dosage the normal and the tuberculous animals react in different manners to the reception of tubercle bacilli. The normal animal shows a slow development of a disseminated tubercu-

losis with tubercle formation, while the tuberculous animal shows a sharp, local inflammatory reaction with exudation, caseation, and tissue necrosis, and a resistance to the spread of the tubercle bacilli. It has been shown that this initial inflammatory reaction of tuberculous animals is due to a tissue hypersensitivity to tuberculo-protein, or to the presence of allergy. For a long time it was believed that the initial allergic inflammatory reaction was responsible for immunity to further tuberculous infection—in short, that the allergic inflammatory reaction fixed the tubercle bacilli at the site of injection, inhibited their growth and dissemination, and aided in their destruction.

In 1929 Rich[43] and his co-workers sharply challenged this concept of the nature of immunity in tuberculosis, and pointed out that there was not a single experiment which indicated that tissue hypersensitivity or the allergic inflammatory reaction was in any way responsible for acquired immunity. In extensive experimental and pathological studies they demonstrated that the inflammatory, caseating reaction of tuberculous animals to injection with tuberculin or tubercle bacilli was due to hypersensitivity of the tissues to tuberculo-protein or allergy. While this inflammatory reaction may dilute the tuberculo-protein, immunity is due to some entirely different mechanism. Furthermore, the initial inflammatory response of the tuberculous animal and the development of a slow progressive tuberculosis by the normal animal may be varied by alterations in the dosage and virulence of the tubercle bacilli. Their studies on the relation of allergy to immunity were extended to a variety of other nontuberculous infections—to syphilis, pneumococcal and pasteurella infections—and this same fact illustrated that allergic inflammation is not responsible in any way for immunity, but that allergy and immunity are distinct clinical entities. Further studies in animals hypersensitive and immune to pneumococcal and pasteurella infections showed that allergy could be completely removed by desensitization, while the immunity remained undisturbed. In 1934 Rothschild, Friedenwald, and Bernstein[44] illustrated the same fact for tuberculosis—that animals rendered immune and allergic by infection with virulent tubercle bacilli could be completely desensitized by repeated large doses of tuberculin and the allergy completely removed, while the immunity remained undisturbed. The desensitized animals showed no inflammatory reaction to reinfection with tubercle bacilli, while they were as resistant as before to the spread of tubercle bacilli and reinfection. Klopstock, Pagel, and Guggenheim[45] showed that an artificially induced local anaphylactic reaction had no effect on retarding the growth or dissemination of tubercle bacilli implanted at the site of the local reaction. A recent experiment by Lurie[46] has shown that under certain conditions of dosage the initial inflammatory reaction, far from fixing the bacilli at the portal of entry, may actually sweep and flood them to the surrounding tissues and adjacent lymph nodes.

While the acute inflammatory reaction is dependent upon a hypersensitivity of the tissues to tuberculo-protein, the nature of immunity is not so clearly understood. The subject has been investigated by Rich and his co-workers, Lurie, and others. Certainly there are two factors, a humoral and a cellular. The humoral elements are most probably concerned with the immobilizing effects on the bacteria by antibodies in the body fluids, while the cellular element is chiefly dependent on the ability of the macrophages to phagocytose, engulf, and destroy the bacteria.

In tuberculous infection, the initial outpouring of polymorphonuclears is apparently without direct effect on the bacilli. Other possible factors are the mechanical localizing effect of the fibrin wall and certain physio-chemical reactions in the inflamed lesion.

As a result of their studies Rich and McCordock suggested the following law of relationship of the tuberculous lesion to infection, allergy, and immunity.

$$\text{Lesion} = \frac{\text{Virulence} \times \text{Number} \times \text{Degree of Allergy}}{\text{Resistance}}$$

Thus with a high degree of allergy and a large number of invading virulent bacilli with low resistance, a spreading caseating lesion would result, while with a low degree of allergy, high resistance, and a small number of virulent organisms, the resulting lesion would be minimal. Variation in the degree of allergy and immunity and in the number and virulence of the bacilli give lesions between these two extremes.

On this concept of the mechanism of local tuberculous lesions, the different types of tuberculous lesions of the eye can be understood. The spreading caseating lesions with a tendency to perforate the globe indicate a large number of virulent bacilli in an individual with a high degree of ocular allergy and a low immunity, while lesions at the other extreme, self-limiting and rapidly quieting, indicate a small number of bacilli in an individual with low or moderate ocular allergy and a high resistance. If the bacilli responsible for the initial lesion are not destroyed, inflammation may recur on a resensitization of the occular tissues, or on fluctuations in the immunity. Tuberculous lesions between these two extremes would be due to variations in the number and virulence of the invading bacilli and in the degree of allergy and immunity of the host.

On the basis of this knowledge of the pathogenesis of tuberculous lesions, the primary therapeutic aim of removing the factors responsible for acute inflammation and the spread of the lesion, and the promotion of the factors responsible for encapsulation and healing, may now be translated in the abolition of allergy or tissue hypersensitivity to tuberculo-protein, and the promotion of immunity. Practically, how may these ends be attained?

Under the older concept that allergy was responsible for immunity, tuberculin was used with the idea that it evoked small repeated allergic reactions about the tuberculous focus in the eye and that this produced a local immunity. The effort was made to keep the dose sufficiently small so that disastrous focal reactions were avoided. Once this immunity was established and the lesion became quiescent, further tuberculin was unnecessary and was discontinued. This older method may be called the "Perifocal Concept" for the use of tuberculin.

Tuberculin used under this concept doubtless produced a certain amount of tissue desensitization, and if destructive focal reactions were avoided, greater desensitization could probably be obtained in a limited time than by smaller amounts of tuberculin given over the same period. To this extent tuberculin treatment under the perifocal concept was successful. All too frequently, however, the slight perifocal reactions sought for were not minimal, but actual focal reactions of more or less intensity, and at times produced irreparable damage in the diseased eye. Similarly, the quieting of the lesion was not an actual healing, but only a subsidence, and recurrences of inflammation occurred, often with increased violence and spread of the lesion. Thus tu-

berculin treatment in ophthalmology began to fall into the same disrepute it had acquired in the treatment of pulmonary tuberculosis, as is evidenced by the report of Derby and Carville[47] in 1927.

The second method of using tuberculin is radically different, and is based on the reasoning that it should be used to remove the tissue hypersensitivity, to achieve and maintain tissue desensitization, and to allow the little-understood forces of immunity free play in the final healing and encapsulation of the lesion.

TABLE 3

RESULTS OF TUBERCULIN THERAPY UNDER PERIFOCAL AND DESENSITIZATION CONCEPTS

Method of treatment	No. of Patients	Results		
		Healed	Improved	Unimproved
Perifocal concept	143	74 or 51.9%	44 or 30.7%	25 or 17.4%
Desensitization concept	32	22 or 68.7%	8 or 25%	2 or 6.3%
Perifocal concept observation over 2 years	74	42 or 56.7%	15 or 20.3%	17 or 23.0%

To this end tuberculin is given in minimal doses, always well below the patient's individual point of reactivity, increasing the dose as this point of reactivity recedes, until finally tissue desensitization is achieved. It must then be continued for a long period of time, to prevent the resensitization that would invariably recur, until encapsulation has occurred and the bacilli have been destroyed. This method of treatment may be called the "Desensitization Concept."

How may these small doses administered subcutaneously achieve desensitization of the diseased eye when even after long use and steady increase of the dose they only slightly alter the general skin reactivity? There is some interesting work on this point. As early as 1912, Lewis[48] showed that certain dyes, when injected intravenously, within a few days permeated the caseous center of a tuberculous mass. This was further investigated by deWitt[49] and other investigators. As a result of these studies it has been shown that dyes of a fine colloidal suspension have a predilection for injured or diseased tissue and tend to filter out and he deposited at such sites. Tuberculin is a highly diffusible colloid and appears to have the same predilection for inflammatory foci. An example of the well-known Shwartzman phenomenon is illustrative. A prepared inflammatory focus caused by a nonspecific inoculum such as a colon-bacillus filtrate, will be activated by intracutaneous injection of tuberculin. Such a reaction is entirely nonspecific, and is an example of the predilection of a highly diffusible tuberculin to filter out and be deposited in a local inflammatory focus. Such a concentration of tuberculin about a local tuberculous inflammatory focus might well produce a selective local desensitization. This point is at present under investigation by Rich and his co-workers.

How do the results of treatment under the older perifocal concept and the desencitization concept compare? The results of tuberculin therapy in the treatment of ocular tuberculosis in the Wilmer Institute on both the perifocal and desensitization concepts have recently been analyzed. In both series of cases the diagnoses were made on the same criteria already outlined, and largely by the same staff. They include all cases of keratitis, kerato-iritis, scleritis, choroiditis, retinal periphlebitis,

and uveitis in which, after exhaustive study, the etiology was believed to be tuberculosis. The same adjunct treatment was used in both series. They differ only in that one group was treated under the perifocal concept, with only one course of tuberculin, and specific therapy then abandoned, while the second group was treated under the desensitization concept with tuberculin for a minimum of over two years. The two groups are therefore strictly comparable. A comparison of the results is shown in table 3.

While the number of patients treated constantly over the longer period is much smaller than the number given only one course of tuberculin, nevertheless the difference in results is sufficiently striking to be indicative of the superiority of treatment on the desensitization concept. To meet the possible objection that the better results observed by desensitization are only a reflection of the longer period of observation, the results in 74 patients treated on the perifocal concept, and observed over a minimum period of two years, are likewise shown in table 3. The results are essentially the same as those shown in the total group treated under the perifocal concept, and are perceptibly worse than those treated by desensitization.

There are certain broad principles inherent to the desensitization concept of the use of tuberculin which must be emphasized. In patients with a high degree of skin sensitivity and with an active tuberculous focus in the eye, the sensitivity of the eye is probably even greater than that of the skin, and tuberculin must be used with caution and in minute doses. The dose must always be kept below the patient's individual point of skin and ocular reactivity, and only increased as this point of reactivity recedes. All local, and especially all focal eye reactions must be avoided. This can only be done by the repeated careful examination of the patient during his course of treatment, and the regulation of the tuberculin dosage according to the patient's general and eye condition. Even after all local ocular inflammation has subsided, tuberculin therapy must be continued for a long period to achieve and maintain complete tissue desensitization. When treatment is at last discontinued, the patient should be repeatedly examined for a return of skin-reactivity, and with a recrudescence of skin-sensitivity, even though the eyes are entirely quiet, tuberculin therapy should be recommenced. Return of skin hypersensitivity frequently foretells a return of the ocular inflammation. In practice, whenever possible, patients with eye tuberculosis are carried on with increasing doses of tuberculin until a minimum of 100 mg. can be taken without reaction, and this dosage is maintained at weekly intervals for one year or longer after all signs of ocular activity have ceased. The patient is thereafter repeatedly examined at three-month intervals for several years, and tuberculin therapy recommenced with any return of skin-reactivity.

Even under the desensitization concept there are dangers and contraindications to the use of tuberculin, which must be emphasized in one especial class of patients. From the standpoint of reaction to tuberculin treatment, patients with ocular tuberculosis fall roughly into two groups. The first group is extremely hypersensitive to tuberculin and often shows acute spreading inflammation in the eye. Any dose of tuberculin, no matter how small, frequently appears to activate the ocular lesion. The second group shows usually a low or moderate hypersensitivity to tuberculin, and the eye lesions are usually self-limited and under treatment have a decreasing tendency to recurrences. This group usually takes tubercu-

lin well without local or focal reactions. In the first group, not only are the ocular tissues highly sensitized, but there is also probably an insufficient concentration of immune antibodies. These patients are spoken of as "uncompensated." In the second group, while the local tissues are probably also highly sensitized, there is, however, a sufficient concentration of immune antibodies. In the first group of patients Samoilov and Hochran[50] believe the dangers of tuberculin therapy far outweigh its usefulness. While tissue desensitization is urgently required in these patients, some preliminary step to increase the local concentration of immune antibodies is often required before tuberculin can be used.

Experimental studies have shown the concentration of immune antibodies in the aqueous to be well below their concentration in the blood serum. If, however, the aqueous is withdrawn, the concentration of antibodies in the re-formed aqueous is considerably elevated, usually several hundred times the content in the original aqueous. This is the theoretical basis of the therapeutic paracentesis of the anterior chamber used for years in the treatment of certain forms of ocular tuberculosis. It is of especial value in tuberculosis of the anterior ocular segment, where the inflammatory process is intense and continuous, and the patients usually take tuberculin badly. Shieck[51] has amplified this procedure by the injection of the patient's own blood in the anterior chamber after the aqueous has been withdrawn. This additional step, aiming at the further concentration of antibodies in the anterior chamber, seems to have little advantage over simple paracentesis. In the first group of patients, where the inflammation is acute and spreading and the concentration of humoral antibody appears inadequate, paracentesis, or paracentesis combined with autohemotherapy, frequently gives strikingly brilliant results, with a prompt subsidence of the local inflammation, and permits tuberlin treatment to be undertaken with little danger of a focal eye reaction.

The promotion and maintenance of immunity with resultant encapsulation of the lesion and destruction of the bacilli is the ultimate goal in the treatment of ocular or any other form of tuberculosis. Some evidence has recently been brought forward by Thompson, Pfeiffer, and Gallardo,[52] indicating that irradiation produces a concentration of immune bodies in the cornea, and thus promotes local immunity. This may be the explanation for some of the splendid and otherwise inexplicable results that follow certain forms of phototherapy in corneal tuberculosis. However, except for this possibility, there are no direct practical means of stimulating immunity, for vastly less is known of its mechanism than is known of allergy. Hence resort must be had to general measures. As in any other form of tuberculosis, rest, freedom from overstrain, cleanliness, fresh air, sunshine, and adequate diet tend to increase immunity and are of the highest value in ocular tuberculosis. Their proper regulation often marks the turning point in the disease. Climatic treatment and high altitudes, however, appear to have little or no effect on ocular tuberculosis uncomplicated by active pulmonary tuberculosis. Werdenberg, it is true, insists on the importance of high altitude, and stresses the point that by moving patients under treatment with tuberculin from low altitudes to high altitudes, unhappy tuberculin reactions may be avoided. This is, however, not the view of most students of ocular tuberculosis, and it is the general consensus of opinion that sanitarium treatment of eye tuberculosis, unless complicated by active pulmonary lesions, is of little value.

The possibility of an artificially produced immunity in the treatment of ocular tuberculosis is a fascinating problem. As early as 1893 Trudeau[53] showed that the vaccination of rabbits by avian tubercle bacilli gave a definite protection against the later inoculation of the anterior chamber with virulent human bacilli. These experimental rabbits were studied by Welch, and Trudeau's observations confirmed. Thereafter little attention appears to have been paid to artificial immunization in ocular tuberculosis. The obvious reason is perhaps the demonstration that the injection of either a heat-killed vaccine or attenuated living cultures such as B.C.G. produced a great increase in the tissue sensitivity to tuberculin. Since under the present conception of the treatment of ocular tuberculosis the most important aim is to achieve desensitization of the eye, actual vaccination with either attenuated living or heat-killed organisms would therefore be contraindicated. Trudeau's[54] statement in 1903 that "artificial immunity against tuberculosis in man or animals has always been looked upon as a result never likely to be achieved" may probably be accepted, even in the light of the recent extensive experiments where increased resistance to tuberculosis has been shown by children and adults vaccinated with B.C.G. or heat-killed virulent bacilli. However, in ocular tuberculosis even when tissue desensitization is obtained to the point where the patients can successfully tolerate the large dose of 500 milligrams without reaction, and the eyes are apparently healed, there is always the possibility that sensitivity may return with a recurrence of the ocular inflammation. Quite evidently, living bacilli, inadequately encapsulated, remain in the eye. In such selected cases, where tolerance for large doses of tuberculin has been obtained and there is little fear of a focal reaction in the eye, the possibility of enhancing the acquired immunity by vaccination with such organisms as B.C.G. is an engaging idea. It has apparently never been attempted, and would be an interesting point for determination in experimental animals.

Although experimental investigations and clinical observation clearly indicate that tissue desensitization is an essential step towards the ultimate healing of a tuberculous lesion, there are manifest gaps in knowledge, and inadequacies in the application of this principle to ocular tuberculosis. Since the primary aim is desensitization of the eye tissues, it is apparent that the presence and degree of ocular sensitivity should be known before desensitization can be intelligently undertaken. There is no practical method for the clinical determination of ocular sensitivity. The Calmette reaction shows primarily the conjunctival hypersensitivity, and only secondarily the ocular sensitivity, for but a small and unpredictable amount of tuberculin is absorbed from the conjunctival sac into the eye. It is the present custom to accept dogmatically the degree of skin-reactivity as an index of ocular sensitivity, and base our initial dose of tuberculin on this assumption. There is every reason to believe that in patients with ocular tuberculosis, skin sensitivity to tuberculin in no way parallels ocular sensitivity. The question was studied recently by Krasso,[55] using a modified Calmette technique. A small fraction of the dose of tebe protein which evoked a skin reaction was injected subconjunctivally in a few patients with ocular tuberculosis. A small episcleral lesion with round-cell infiltration resulted. Krasso believed there was a wide difference in the ocular and skin sensitivity in these patients, the ocular sensitivity being much higher. This question has been under active investigation in the Wilmer Institute during the last two years. To

date the studies have been confined to normal rabbits, infected either systemically or in the eye. The studies on systemically infected animals with a secondary ocular infection, a condition comparable to that in humans, are still incomplete. In the systemically infected animal with normal eyes, skin sensitivity and ocular sensitivity run roughly parallel, the eyes participating in the hypersensitivity developed in the general body tissues. If the tuberculous focus lies in the eye, however, there is no relation between ocular and skin sensitivity, ocular sensitivity running immeasurably higher.

Further, there is no knowledge of the fluctuation in ocular sensitivity which may occur before, during, and after an attack of ocular tuberculosis. It is quite probable that active tuberculous inflammation and ocular sensitivity are intimately related. This is indicated by the following clinical experiment. Four patients, blind in one eye from a recurrent tuberculous uveitis, were tested with a graduated Calmette test in the blind eyes at the beginning and at the end of acute inflammatory attacks. One drop of a 1:100 dilution of the weakest tuberculin solution to which the patient had been skin-reactive was used as the test dose. Two of these patients reacted with a prompt increase in the uveal inflammation. The remaining two patients showed little or no uveal reaction to the 1:100 dilution, but when retested with a 1:10 dilution of the skin-reactive dose showed a definite reaction. These eyes then ran typical courses of uveitis, varying from four weeks to three months when they became quiescent. The eyes were then retested with a graded Calmette reaction, and there was no uveal reaction in any of these patients up to and including the instillation of 100 times the amount of tuberculin to which the eyes had previously reacted. While no conclusions can be drawn from such an experiment, it is apparently clear that the eyes were more reactive at the beginning of an attack than at the end, or, in other words, the subsidence of inflammation was accompanied by a reduction in the degree of ocular sensitivity. At the same time there was no marked change in the degree of skin-reactivity of these patients.

Recent animal experiments in the Wilmer Institute throw some light on this observation. It was found that if normal rabbits were infected in the eye by proper inoculation with virulent tubercle bacilli, that ocular sensitivity and tuberculous infiltration developed synchronously. When the ocular sensitivity reached the point where caseation and necrosis were observed clinically and histologically, the eyes gradually lost their capacity for vascular reaction, the blood vessels being apparently blocked off by the caseation. The active tuberculous infiltration ceased, and repair and scarring began only when all histological evidence of allergy had disappeared. Tissue hypersensitivity had apparently been neutralized by the tuberculous inflammation. When the repair stage was reached, vascular reactivity gradually returned, and six months after the subsidence of the attack, ocular sensitivity, as manifested by the vascular and cellular response to purified protein derivative, had returned to a marked degree. During this entire period of observation skin sensitivity remained low.

On the concept of tissue desensitization, and especially in the light of the idea that an attack of ocular inflammation may temporarily neutralize the local sensitivity, steadily increasing the dosage of tuberculin during the attack will be obviously wrong. If the local ocular lesion is itself producing tuberculin, and accomplishing local tissue desensitization, the systemic dosage of tuberculin should theoretically be reduced during the period

of ocular activity and increased later during the period of remission, with the idea that the eye may participate in the general tissue desensitization and resensitization be avoided.

Although Trudeau's[56] observation in 1892 indicated that tuberculin injections had a marked therapeutic effect on ocular tuberculosis, there has been little or no investigation since then on the effect of tuberculin therapy in experimental ocular tuberculosis in either the normal or systemically infected animal. As already mentioned, there is some evidence to indicate that tuberculin injected subcutaneously is concentrated at a focus of local inflammation, and there is also indirect clinical evidence indicative of selective desensitization of the local tuberculous focus. It should be relatively simple to determine if subcutaneous desensitization with tuberculin of an experimental animal results in desensitization of a tuberculous eye. This, the most fundamental point in the desensitization concept of tuberculin therapy, is still unproved.

Finally, since the fundamental aim is to obtain desensitization of the tissues of the eye, it is possible this might be accomplished more surely and quickly by methods other than the subcutaneous injection of tuberculin. The dangers of subconjunctival injections are obvious, but nevertheless it has been attempted by several authors. Darier[57] attempted the subconjunctival use of tuberculin as a therapeutic measure and abandoned it on account of the untoward reactions. However, Krasso has used it successfully, and reports a prompt therapeutic effect after one, two, or at the most three injections, and Zass[58] has used tuberculin instillations in the conjunctival sac, beginning at dilutions of 1:2000, and reports gratifying results in corneal tuberculosis after two months' treatment. The possibility of exploring this field in experimental animals appears to have been overlooked.

Conclusions

1. The diagnosis of ocular tuberculosis must be based on the course and character of the lesion, on the exclusion of other etiological factors, and on a study of the general tuberculous status of the patient. The tuberculin reactions are of value only when strongly positive. Weak or negative reactions are of no significance for or against the diagnosis of ocular tuberculosis.

2. The therapeutic problem centers on a proper conception of the influence of allergy and immunity on the local tuberculous lesion. The therapeutic aim should be to abolish allergy and promote immunity. Tuberculin finds its greatest value when used on the desensitization concept over a long period of time. Immunity can be promoted only by general measures.

3. There are contraindications to tuberculin in certain cases. There are wide gaps in our knowledge of the relation of skin and ocular sensitivity and of the proper administration of tuberculin.

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LEBER'S DISEASE

Report of four cases in one family*

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In 1871 Theodore Leber[1] published his paper, "Ueber hereditäre und congenital-angelegte Sehnervenleiden," and, even though this was by no means the first account of the disease, his description was so widely acknowledged that the condition has since frequently been termed "Leber's disease." Leber's paper provided an impetus to the study of hereditary optic atrophy, and since his time there have been many papers on the subject.

Julia Bell, in 1931, made an exhaustive study of the disease.[2] The material on which she worked had been collected from published reports of cases which provided 1,182 affected individuals for study: 1,018 were Europeans, the remaining 164 were Japanese. From her study Bell pointed out the main features of the disease as follows: 1. There is a predilection for the male sex (84.8 percent males among Europeans and 59.1 percent males among Japanese). 2. The average age at the onset of the disease among Europeans is 23 years for males and 25 years for females, whereas among Japanese the average age at the onset of the disease is 21 years for males, 20 years for females. 3. The impairment in vision advances relatively rapidly, probably in most cases providing the maximal disability within two months from the time of the onset; rarely do symptoms advance after six months. 4. In the majority of cases the disease comes on while patients are in good health, and there is no other disease characteristically associated with hereditary optic atrophy. 5. Usually the patient's sole complaint is diminution of vision; the visual defect most common is central scotoma although peripheral contraction of the visual fields is also frequently seen. 6. Color blindness is usually the only other symptom shown by patients with hereditary optic atrophy. 7. The appearance of the fundus in the early stages of hereditary optic atrophy may vary from complete normality to the picture of optic neuritis, which is characterized by reddening of the nerve head, blurring of the disc margins, tortuosity and dilatation of the vessels, and in some instances, small hemorrhages. When present, the inflammatory signs are temporary and are soon followed by atrophy of the nerve which progresses and may advance after diminution of vision has become stationary. Even though the sight may subsequently markedly improve, the disc never regains its normal appearance. 8. Estimates of the number of patients suffering from hereditary optic atrophy whose vision subsequently improves range from 10 to 29 percent. Points which seem to bear on the prognosis for the individual are: (a) onset at an early age appears to indicate a relatively favorable outlook, and (b) not only is liability to the disease inherited, but the tendency to improvement is also inherited, improvement occurring more readily in some families than in others. 9. Transmission of the disease through the father is relatively rare; in 93.6 percent of the cases in which Europeans were affected the mother transmitted the disease.

The first patient in our series was a girl,

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aged 18 years. She presented herself at the clinic on April 29, 1936, complaining of blurring and loss of vision of four months' duration. She had had no serious illnesses and was unaware of any hereditary dis-

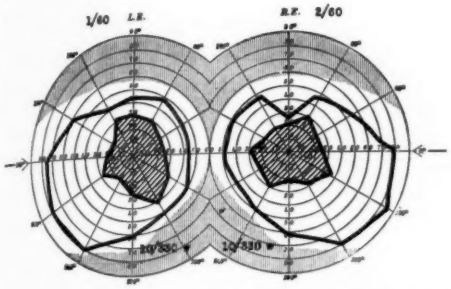

Fig. 1 (Raaf and Bair). Visual fields of daughter (May 2, 1936), showing large, bilateral cecocentral scotomas.

ease in her family. On January 1, 1936, she had suddenly noticed blurring of vision while reading. Within four or five days her vision had become so poor that she had had to stop school. She consulted several physicians, and a diagnosis of optic neuritis in the right eye was made. Her tonsils were removed, but loss of vision gradually increased.

On general examination the patient appeared to be well developed and well nourished. Examination of the teeth, nose, throat, and pelvis did not reveal any foci of infection. The urine and blood appeared to be normal; no lead or arsenic was found in the urine. The sedimentation rate of erythrocytes was 5 mm. in one hour. Roentgenograms of the thorax and head, and also of the sella turcica and optic foramina, were negative.

Inasmuch as no toxic factor could be found to account for the patient's amblyopia, she was questioned further regarding the onset of her condition. There was found to be a conflict at home and this, it was thought, might be the basis of an hysterical amblyopia. The results of psychiatric examination, however, did not definitely confirm the diagnosis of hysterical blindness.

Vision in the left eye was 1/60, in the right eye 2/60; the ocular fundi were normal. On examination of the visual fields, large bilateral cecocentral scotomas were found (fig. 1). It was then thought that the patient had some obscure type of retrobulbar neuritis rather than functional amblyopia. Spinal puncture gave negative results. Examination of the ocular fundi and visual fields was again made on May 6th, and then again on May 8th; the results of these examinations, however, did not differ greatly from those of the original examination (fig. 2). The scotomas tended to assume a right homonymous position, and it was thought that the constancy of the scotomas spoke for an organic lesion.

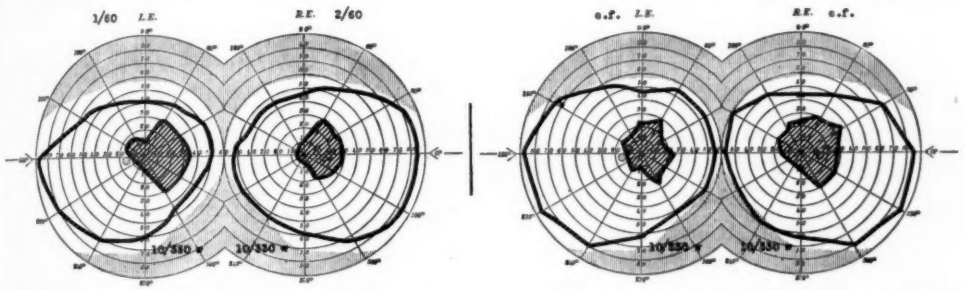

Fig. 2 (Raaf and Bair). Subsequent appearance of visual fields of daughter (May 6th and May 8th), showing tendency of the scotomas to assume a right homonymous position.

That the condition might be Leber's disease was suspected when the patient's mother, aged 42 years, was referred to the Section on Ophthalmology 15 days after

her daughter was first examined there. The mother had registered at the clinic on May 12, 1936, for a general examination and was referred to the eye department after she volunteered the information that she had had poor eyesight since the age of nine years. She recalled that at the age of nine she had suffered a sudden decrease in visual acuity, with subsequent improvement in vision. She also remembered that two of her brothers had had eye trouble in childhood. On examination her vision was found to be 6/12 in the left eye, 6/7 in the right. She had bitemporal hemianopia, more marked in the upper quadrants, with relative concentric contraction of the residual fields; no central scotomas were demonstrable (fig. 3). Examination of the ocular fundi revealed pallor of both optic discs and an increase of connective tissue on the vessels near the discs. Because of the bitemporal hemianopia the patient's sella turcica and optic foramina were examined roentgenographically, but they were found to be normal, and it was concluded that the visual defect and pallor of the discs were the result of an old retrobulbar or optic neuritis. These facts, together with the fact of the daughter's visual defect, seemed to constitute sufficient evidence for a diagnosis of Leber's disease.

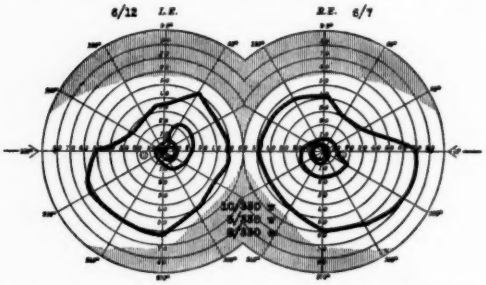

Fig. 3 (Raaf and Bair). Visual fields of mother (May 14, 1936), showing bitemporal hemianopia and relative contraction of residual fields.

The eldest maternal uncle of the daughter was one of those who had had eye trouble in childhood. Fortunately he was able to come to the clinic for examination and was able to give us an excellent family history (fig. 4). He said that none of his grandparents were known to have had eye trouble, but that there was a vague history of his mother's grandfather having had it. His father was, at the time of this writing, alive and well at the age of 77 years, and his mother alive and well at 76. Both had good eyesight. There were eight children of this marriage, all of whom were alive and well. This uncle (our informant) at the age of five years had undergone an operation for squint of the left eye. Although vision in this eye had always been impaired, he had experienced very little trouble in seeing until he reached the age of 21, when there was rapid failure of vision; in fact, his vision diminished so rapidly in both eyes that, at the end of two weeks from the onset, he was practically blind. Three months later his brother, who was then 13 years old, began to have the same trouble with his eyes, and his vision diminished until, at the end of a year, he was barely able to see moving persons. Four to five months after the onset of the elder brother's trouble, a sister, then nine years old (the mother of the original patient) became affected.

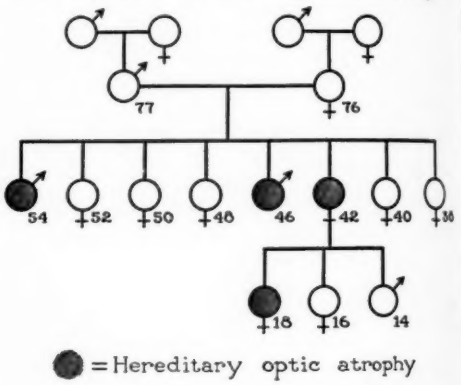

Fig. 4 (Raaf and Bair). Genealogic chart, the shaded circles indicate members of the family who suffered from eye trouble (the numbers represent their respective ages).

Because these three children were affected within a few months of each other it was thought that they were suffering from some contagious eye disease. Each had then had some form of treatment: the two brothers received local applications and drops; the sister, 97 chiropractic treatments. All three experienced improvement in vision within seven months to a year.

The vision of this maternal uncle on examination at the clinic was found to be 6/15 in the right eye and 6/60 in the left. The squint for which he had been operated on at the age of five was no doubt partially responsible for the poor vision in his left eye. Examination of his visual fields revealed in the right eye an upper-temporal-quadrant defect continuous with the physiologic blind spot, and in the left eye a cecocentral scotoma continuous with a defect in the upper temporal quadrant. There was concentric contraction of the residual fields in both eyes (fig. 5).

The other uncle with eye trouble has not been able to come to the clinic for examination, but he wrote that his eyesight had begun to improve about a year after the onset of the disease. He estimated that he had regained approximately 80 percent of his original vision, being able to read fine print without glasses. There was some evidence that he still had slight residual central scotomas, for he said that at times he had difficulty locating traffic signals but that, after locating them, he could see them quite clearly.

The other five children in the family, uncles and aunts of the original patient, have never had any trouble with their eyes. Neither of the two brothers who suffered from the disease has married, and, so far as we have been able to find out, none of the children of the other brothers and sisters except the original patient has been affected. The patient has a sister, aged 16 years, and a brother, aged 14 years, but neither has had any eye trouble.

A point to which attention should be called is that the residual visual fields of the patient's mother (fig. 3) and uncle

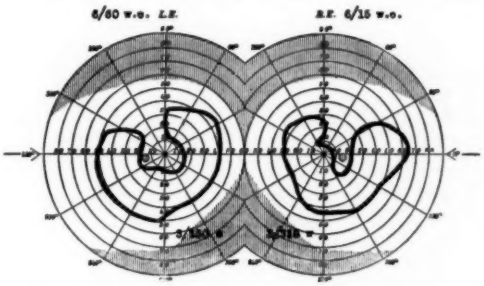

Fig. 5 (Raaf and Bair). Visual fields of uncle (May 25, 1936), showing upper-temporal-quadrant defect in right eye, cecocentral scotoma in left eye, and concentric contraction of residual fields in both eyes.

(fig. 5) are both suggestive of a bitemporal type of hemianopia. Numerous authors have considered the possibility of an intracranial lesion, particularly in the region of the sella turcica, being the etiologic factor in Leber's disease. Bruner[3] reported that roentgenographic examination of the patient in his case, as well as of the patient's sister and nephew, all of whom had hereditary optic atrophy, revealed enlarged sphenoidal cells. The mother and another sister of the patient who did not have optic atrophy had smaller sphenoidal cells. Bruner quoted Berger[4] as saying, "A number of cases of hereditary optic atrophy are due to irregularity in the growth of the sphenoid bone." In discussing Bruner's paper, Bedell[5] reported four cases of hereditary optic atrophy, three brothers and a cousin being affected. All of these three brothers had very prominent clinoid processes, with deep sella turcicas; the cousin's sella turcica did not give evidence of this abnormality.

Fisher[6] suggested that Leber's disease is primarily attributable to an inherited temporary disorder of the pituitary gland.

He pointed out that the pituitary gland might hypertrophy at puberty or at the menopause, and thus implicate the visual pathways, producing the field defects seen in hereditary optic atrophy. He made

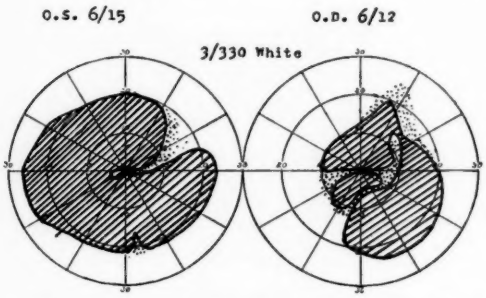

Fig. 6 (Raaf and Bair). Central visual fields of daughter on July 13, 1937, showing partial resolution of central scotomas.

roentgenograms of the sella turcica in two cases of typical hereditary optic atrophy; in one the sella turcica was normal but, in the other, it was filled with a cellular, honeycomblike shadow. He interpreted the latter as being an abnormal sella turcica. Fisher[7] later reported three cases of two brothers and an uncle who had Leber's disease. The roentgenogram of the sella turcica of one of the brothers revealed slight expansion, undermining an irregularity of the postclinoid process; Fisher thought that this supported his view that Leber's disease results from an exaggerated function of the pituitary gland.

Roentgenograms were made in 60 of the cases collected by Julia Bell in order to determine whether there was any abnormality in the region of the sella turcica. In 34 of these cases the sella turcica was found to be normal, and the variation from normal in the remaining 26 cases was so slight or inconstant as to enable no conclusions to be drawn regarding the association of an intrasellar lesion with Leber's disease.

A diagnosis of pituitary tumor was considered in the case of our patient's mother since her visual fields showed a bitemporal-hemianopic type of defect. Roentgenographic examination of the sella turcica of both mother and daughter were, however, as has been said, normal. The patient's uncle, whose visual fields also suggested a bitemporal hemianopic defect, was not examined roentgenographically. It must therefore be concluded that even though two of the patients in this series did have a bitemporal type of defect in the visual fields, no relationship can be considered to have been established between an intrasellar neoplastic lesion and Leber's disease.

Treatment in the daughter's case consisted of the intravenous administration of typhoid vaccine. She received a course of four injections, following which an examination of the visual fields and central vision on May 19th, showed practically no change from the time of the original examination. On examination of the ocular fundi there was thought to be a slight pallor in the temporal part of the discs. Another series of four injections of intravenous typhoid vaccine was administered, but again examination of the visual fields and fundi on June 2d revealed no change, although subjectively the patient thought that her sight had improved.

The patient again returned on March 8, 1937, at which time her vision was found to be about the same as previously, and the optic discs showed a marked pallor with some evidence of loss of substance. She was given four intravenous injections of typhoid vaccine and, on March 18th, her visual fields showed beginning resolution of the central scotomas, consisting in a tongue of relatively improved vision entering the scotoma from each upper temporal quadrant. There was also subjective improvement in the patient's vision. She was again seen on July 13, 1937, and stated that her vision had begun to improve rapidly about 1½ months pre-

viously and had steadily increased until, at this time, she was able to read ordinary print, although slowly. Her visual acuity was found to be 6/12 in the right eye and 6/15 in the left eye. The visual fields showed a quite definite partial resolution of the scotomas, although the island of central vision for a 1-mm. object at one meter's distance was very small, being less than one-half degree in the left eye and about three degrees in diameter in the right eye (fig. 6). Another series of intravenous typhoid injections was given, but there was no subjective improvement in vision. The visual acuity was then recorded as 6/10 in the right eye and 6/15 in the left eye. The visual fields showed the scotomas to be very slightly smaller but otherwise to be essentially the same. The patient was able to recognize a 2-mm. red color and 5-mm. red and blue colors at one meter's distance. There was no apparent change in the ocular fundi.

The prognosis as to the complete return of vision is, of course, indeterminate. Bell's statement that not only a liability to the disease is inherited but also a tendency toward improvement, suggested that the outlook for this patient should be favorable inasmuch as her mother and two uncles had had a good return of vision. Her course so far has supported this, although the presence of marked atrophy of the optic discs makes it probable that much residual defect will be present.

Summary

In this series of four cases of Leber's disease in one family, the bitemporal character of the residual field defect in the two older patients and the homonymous position of the scotomas in the patient with the acute form of the disease suggested a lesion in the region of the optic chiasm rather than in the optic nerve proper. However, roentgenologic examination of the sellar region in the last-named case and in one of the former cases yielded no demonstrable evidence of a causative lesion of the pituitary or adjacent structures. There were no other associated signs of pituitary dysfunction in these cases.

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A METHOD OF FLICKER PERIMETRY*

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If the frequency of flicker of a light be made sufficiently rapid, one experiences a sensation of fusion or continuous light. The period at which this occurs is known as the point of critical flicker or fusion. Early investigators observed that various portions of the retina, stimulated by this flicker phenomenon, react in different ways; that is to say, the critical frequency occurs at different rates at the macula and at various meridians distant from the central point of fixation. The earlier workers used white and colored sectored paper discs for this study. In recent years light from an electric lamp as the source of stimulation has been tried. Among the difficulties in the use of light as the source of stimulus has been that of recording accurately the number of flashes and regulating the rate as desired. Also, the previous instruments described to accomplish light flicker have been cumbersome, thus causing the examination to be time consuming and fatiguing.

As early as 1765 the literature records the simple experiment of D'Arcy[1] in which he attempted to record the speed necessary to whirl a burning stick around his head in order to obtain the sensation of a continuous circle of light. In 1903 Braunstein[2] undertook to diagnose various eye conditions such as optic atrophy, retinitis, detachment of the retina, glaucoma, hemeralopia, and amblyopia ex anopsia by determining the critical fusion frequency with the light reflected from white and colored sectors of discs.

The general results found were that the fusion frequency of pathologically changed eyes was altered and sank to a lower figure the more severe the condition. Later Lohmann[3] demonstrated in cases of congenital amblyopia that the fusion frequency was increased, which was subsequently confirmed by Teräskeli.[4] Lohmann's technique was like that of Braunstein.

In a report of this sort it becomes necessary to refer to investigations which are not entirely relevant to the subject of flicker perimetry because of interest in the methods used in producing flicker. Porter's work[5] was accomplished with sectors on a revolving disc illuminated to various degrees. He was primarily interested in the relationship of the critical fusion frequency and the intensity of the stimulus. Lythgoe and Tansley[6] were investigating the relation of the adaptation of the eye to the critical frequency of flicker. Their methods were similar to that of Porter. Granit and Harper[7] developed an ingenious machine that rotated a sectored disc past a lamp the intensity of which could be varied. The rate of rotation was measured with a mechanical tachometer. Their work had to do with the response of portions of the retina, at fixed degrees from the macula, on the critical frequency of fusion. They did not take complete visual fields.

Later their instrument was modified by Teräskeli[4] by the substitution of an electrical tachometer. This latter author investigated 50 amblyopic eyes with the idea in mind of determining the etiologic factor. She concluded that the critical frequency of flicker method is excellent as an index of retinal function and that amblyopic eyes are dependent upon congen-

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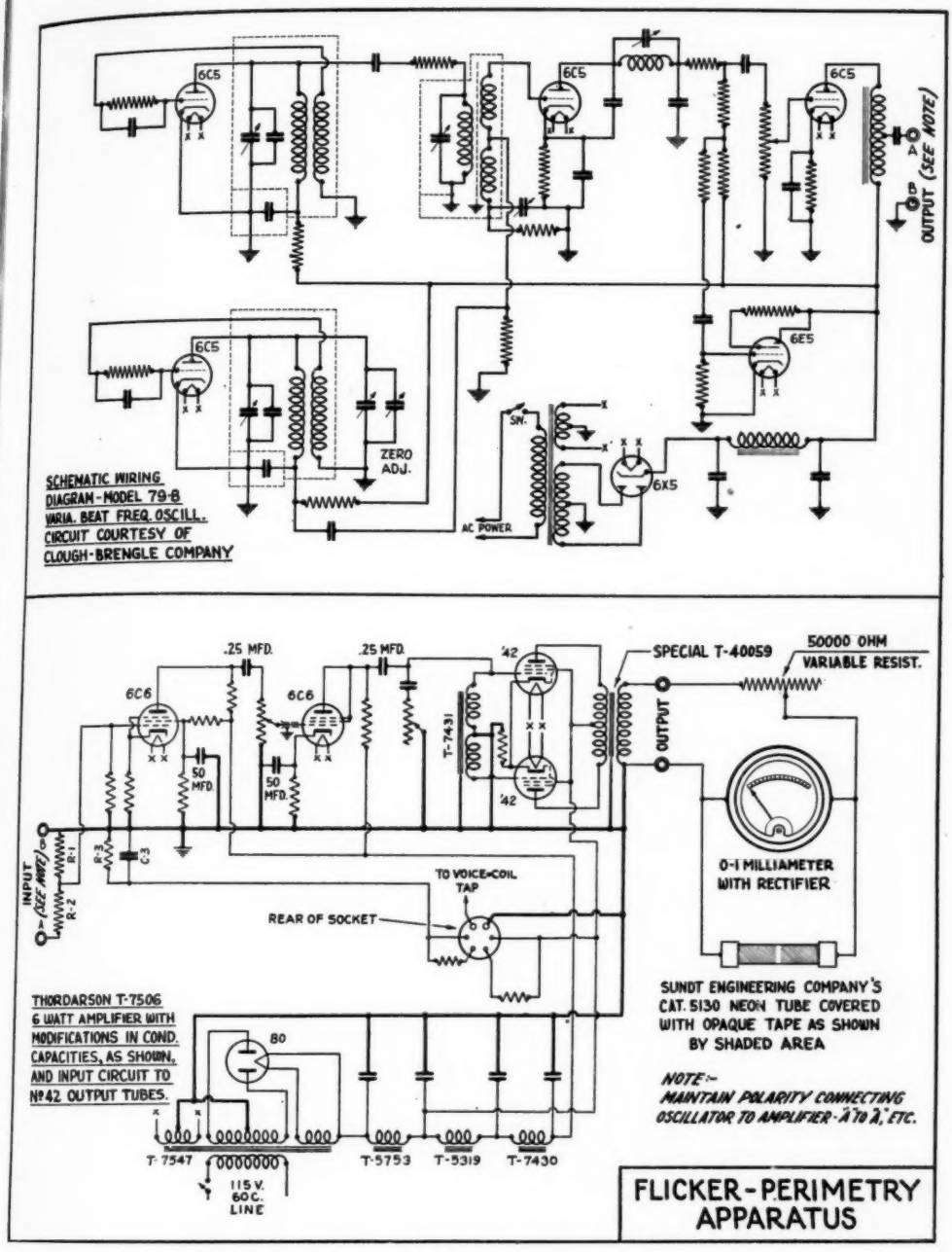

Fig. 1 (Mayer and Sherman). Diagram of flicker-perimetry apparatus.

ital structural changes in the retina. In 1933 Hecht and his co-workers[8] accomplished a series of experiments having a relation to the critical frequency of flicker in regard to area stimulated, comparison of various retinal locations, and the intensity of the stimulus. The apparatus used was that most commonly noted in the physiologic and psychologic laboratory of today, and consisted of a rotating

metal sector that allows the light of a lamp to be seen at varying intervals of time. Enroth and Werner,[9] using the instrument developed by Granit and Harper,[7] studied the critical frequency of fusion in relation to the adaptation of the eye to various degrees of light and darkness. Curves were made showing the relationship at the macula and at 10-, 25-, and 45-degree angles of the retinal peripheries encountered because of the complications of the instrument. Niederhoff[13] has constructed a flicker perimeter consisting of two perforated arcs of metal which move in opposite directions and thus allow the light from a lamp to come through at various intervals. Up to the present time the practicability of this instrument has not been demonstrated.

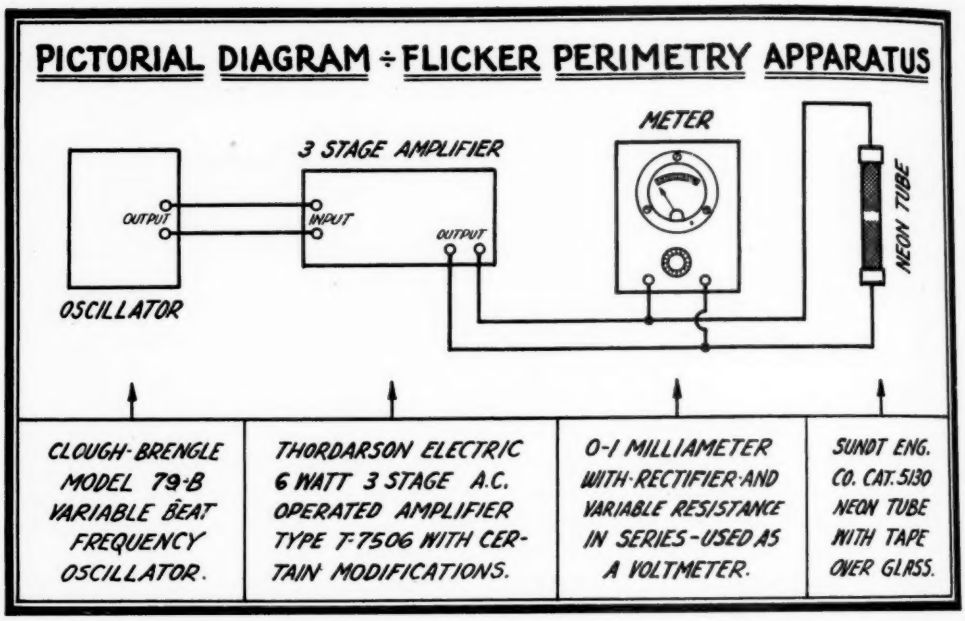

Fig. 2 (Mayer and Sherman). Diagram of flicker-perimetry apparatus.

ery. However, no visual fields were investigated. Grönholm-Therman[10] with a like instrument studied the glaucomatous eye. He was especially impressed by the reactions of the rods of the retina in these patients. Phillips,[11] using a cumbersome machine consisting of rotating mirrors that reflected rays of light from stationary lamps, mapped out the visual fields in intracranial lesions of the visual pathways. Later Riddell[12] with the same equipment investigated the flicker phenomenon of the field of vision. A perusal of his report reveals the many difficulties encountered because of the complications of the instrument. Niederhoff[13] has constructed a flicker perimeter consisting of two perforated arcs of metal which move in opposite directions and thus allow the light from a lamp to come through at various intervals. Up to the present time the practicability of this instrument has not been demonstrated.

An apparatus has been devised to simplify the procedure of flicker perimetry (Figs. 1 and 2). The current from the usual 110-volt alternating power line is put through a heat frequency oscillator. This oscillator is without appreciable drift. A cathode-ray tube indicates any tendency to drift. The oscillator takes a constant current through the range of a specially calibrated scale of from 15 to 200 oscillations per second. The r.m.s. and peak voltage are measured by suitable voltmeters. The oscillator was constructed for us by the Clough-Brengle

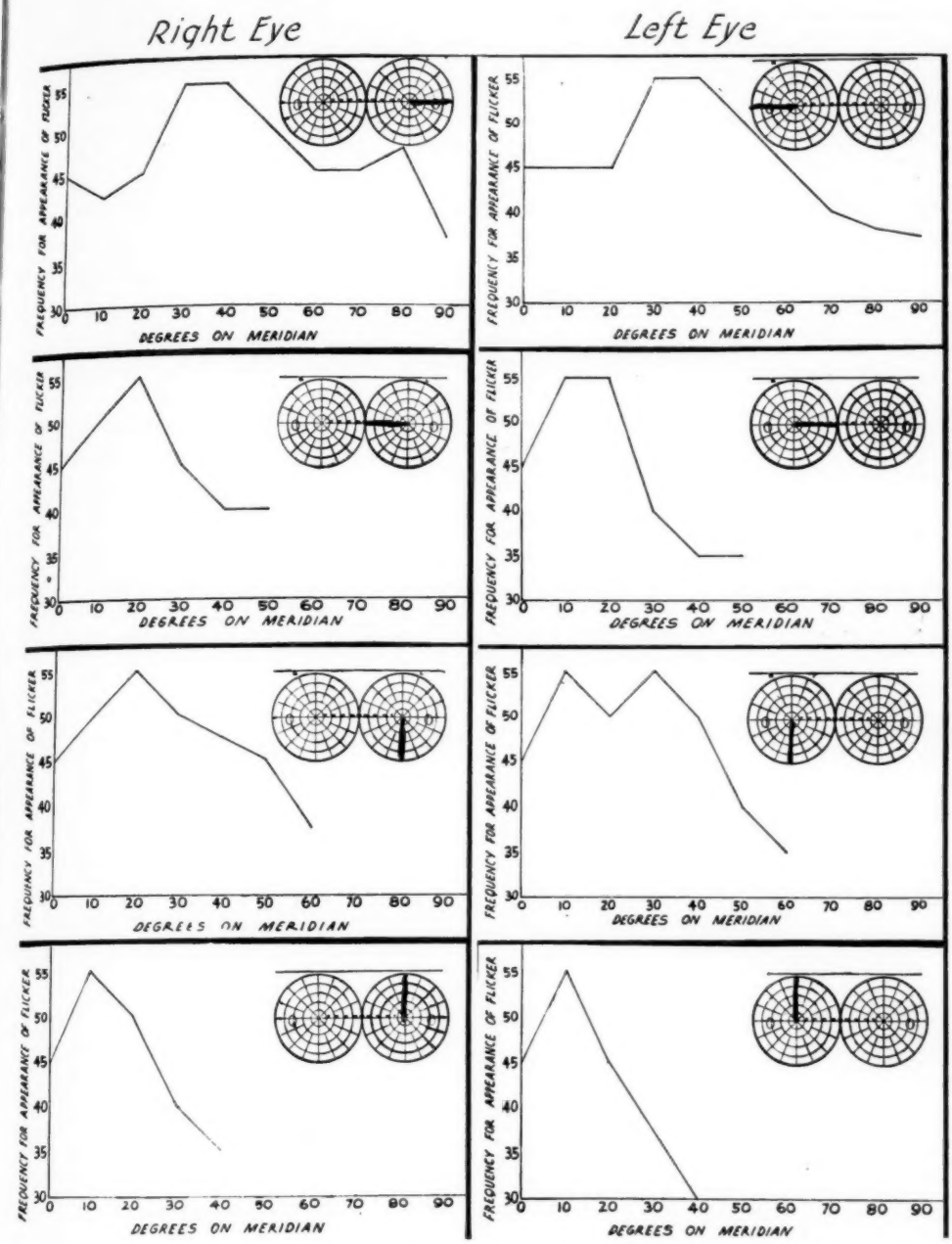

Fig. 3 (Mayer and Sherman). Curves of critical frequency of flicker on principal meridians. (Meridian indicated by black line on field chart.)

Company of Chicago. By means of a 3-stage amplifier the current is led into a small neon bulb. This neon bulb is fitted with an adapter that enables it to be used as a target on the ordinary Schweigger hand perimeter. We have used the "falling" method, as it is called by Riddell, whereby "the flicker starting at a rate that is definitely fused, is slowed steadily and fairly rapidly until it is appreciated as a

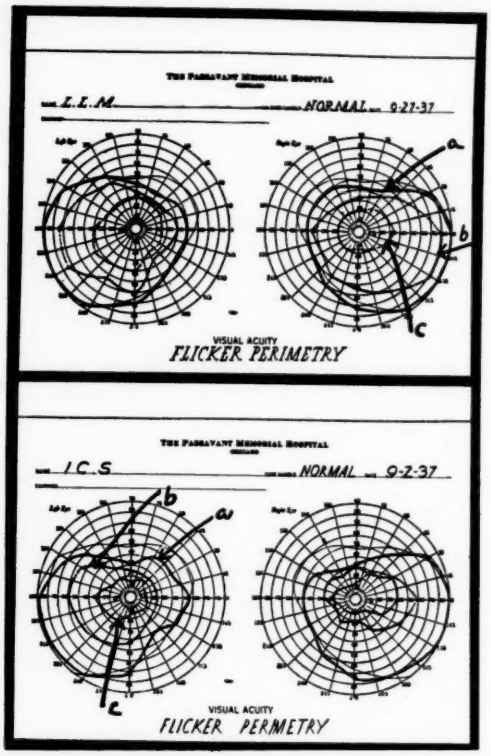

Fig. 4 (Mayer and Sherman). The visual fields of normal individuals taken with flicker perimetry. Normal: 30 oscillations per second, black; 40 oscillations per second, red; 50 oscillations per second, blue. E. N.: 20 per sec., red; 30 per sec., black; 40 per sec., green; 45 per sec., blue. Form fields—1° object, black; 3° object, red. Distance 195 mm. B.R.: 20 per sec., red; 30 per sec., green; 40 per sec., black. 1° object black; 3° object, red.

flicker." Unlike the work of Phillips and Riddell in which they were "quite unable to obtain reliable readings beyond the 40-degrees isopter," we were able to get completed visual fields to the extremity of the periphery. The cumbersome nature of his instrument, as Riddell refers to it, has been entirely overcome by the use of the usual method of recording the visual field. Riddell stated that "even a practised observer will require on an average six observations to establish a value." This was not necessary in our examinations, as a recheck or, at most, a third trial was all that was indicated with our instrument for an adequate result. Curves of the frequency plotted at the various meridians along an horizontal axis agree with the findings of Creed and Ruch[11] and Riddell[12] who found that the peak value is in the vicinity of 10 degrees from the macula in all quadrants (fig. 3). Riddell says "this peak value at about 10 degrees is considered to be due to the junction of the macular area and its even number of cones and ganglion cells with the periphery, where there are many rods and cones to each ganglion cell, as well as a profuse synaptic network."

We present diagrams of the visual fields of normal individuals taken with a frequency of 20, 30, and 40 alternations (fig. 4). The curves mentioned previously show the critical frequency of fusion flicker along the horizontal and vertical meridians.

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ESSENTIAL CARDIOVASCULAR HYPERTENSION AS REVEALED IN ONE HUNDRED CONSECUTIVE EXAMINATIONS OF THE FUNDUS OCULI*

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In the course of a survey of the results of special examinations requisitioned from the Department of Ophthalmology by other services in the Royal Victoria Hospital of Montreal, a wealth of valuable information has been supplied and placed on record. Such information has been placed at the disposal not only of the ophthalmologist but also of those in the various branches of medicine who seek the corroborative evidence or the constructive information which the findings in the fundus oculi so frequently supply in doubtful cases. It was discovered, following a review of a year's work, that of the cases admitted to the Department of Medicine, 10 percent were conditions of hypertension in one form or another, and with such a mass of material at our disposal an avenue of investigation was clearly opened.

It is admitted that the subject has been investigated, and ably so, by many outstanding authorities; but it is felt that unintentionally the title has been sometimes disregarded and the results, in consequence, beclouded through the fact that the authors failed to analyze closely or define the precise type of cardiovascular hypertension with which they were dealing. We have considered the question under discussion, essential cardiovascular hypertension, as separate and distinct from such other varieties as those of nephritic and diabetic origin, as well as those arising from other potential sources.

Some element of appreciation of the foregoing remarks will best be grasped when it is noted that in assembling our series of 100 cases of the essential type, 450 case reports designated as cardiovascular hypertension and extending very slightly over a period of more than two years' time had to be systematically investigated and studied. It is to be recorded with some degree of disappointment that frequently the Department of Ophthalmology had not been requested to submit a report on the fundus oculi, although the case report in other respects invariably

* From the Department of Ophthalmology, Royal Victoria Hospital. Read before the Canadian Medical Association at Ottawa, Ont., June 24, 1937.

was perfect in detail. Such a discrepancy, however, very fortunately for the reviewers, was much more frequently the exception than the rule. Again, the cases of hypertension with an associated antecedent diabetes or nephritis, far outnumbered the type of case which it had been decided to investigate, and these, with the errors of omission previously admitted, had to be put aside.

type of ophthalmoscope always was used, and no findings were recorded unless the pupils were satisfactorily dilated with homatropine.

In the following tables, the results of our findings are registered in such detail as the data permitted.

An analysis of the hundred cases of the essential hypertensive variety which we have made, and a comparison of them

TABLE 1

	Primary hypertensive cases 100 Cases: 52 Females, 48 Males			Primary nephritic cases 17 Cases: 7 Females, 10 Males		
	Low	High	Average	Low	High	Average
Age	39 Yrs.	84 Yrs.	58.7 Yrs.	26 Yrs.	58 Yrs.	41.4 Yrs.
Blood pressure	160/80	260+/120	195.5/110.6	140/80	260+/170	219.4/131.0
Creatinine	1.01 mgm. %	2.14 mgm. %	1.25 mgm. %	1.03 mgm. %	16.8 mgm. %	3.63 mgm. %
N. P. N.	17.1 mgm. %	75.3 mgm. %	30.4 mgm. %	19.1 mgm. %	284.0 mgm. %	90.8 mgm. %
Urine Sp. Gr.	1004	1036	1017	1006	1030	1013
Urine Albumin	0	++	50% showed albumin	++	++++	100% showed albumin
Casts			20% showed casts			80.2% showed casts

Simply to justify our conclusions or to attempt to draw a parallel, a series of consecutive cases of cardiovascular hypertension associated with nephritis have been analyzed, so that a comparison may be drawn and some deductions arrived at, which will be referred to later.

Regarding the ophthalmological investigation, an attempt at uniformity has been made in dealing with the subject. In the first place, the material supplied has been obtained without exception from the social class that is found in the public wards. Furthermore, the ophthalmoscopic examination was carried out and the findings recorded, with very few exceptions, by the same member of the department, and the personal error in interpretation was in consequence avoided. Again, the same

with those of primary nephritic origin afford us the following conclusions (table 1):

As to age, as one would expect, the patients with essential hypertension were definitely more advanced in years than were those whose condition was of nephritic origin, the average of the former being 58.7 years, and of the latter 41.4 years. The reason for this is probably that the cases of primary nephritis for the most part have their origin during childhood, as a result of many intercurrent diseases at that time, while the hypertensive conditions are really the result of an aging process. Among women, the onset of the menopause is an apparent factor.

Blood pressure at first glance would show a seeming discrepancy, ranging in

the hypertensive cases from 160/80 to 260/120, with an average of 195.5/110.6. In the nephritic cases the lowest was 140/80 and the highest 260/170, giving an average of 219.4/131.0. The pulse pressure in the former was 84.9 and in the latter 88.4, the end results showing a relatively slight discrepancy. As would be expected, the blood chemistry values for creatinine and N. P. N. were definitely pathological in the primary nephritic cases, whereas, in the primary hypertensive cases they were essentially normal, although in a relatively few instances high values were found.

The question regarding specific gravity of the urine conveys practically no answer to our argument. As to albumin, however, it was present in 50 percent of the primary hypertensive cases in amounts registered as from 0 to 2 plus while in the primary nephritic cases it ranged from 2 plus to 4 plus in 100 percent of the cases. In the primary hypertensive cases, again, only 20 percent showed casts, while over 80 percent manifested these in the latter class of case.

TABLE 2

PRIMARY HYPERTENSIVE CASES—100 CASES

	Left Eye						Right Eye					
Fundus Changes	Total %	Upper Nasal	Lower Nasal	Upper Temp.	Lower Temp.	Macular	Total %	Upper Nasal	Lower Nasal	Upper Temp.	Lower Temp.	Macular
Normal	29	—	—	—	—	—	28	—	—	—	—	—
Contracted arteries	63	—	—	—	—	—	57	—	—	—	—	—
Contracted arterial capillaries	1	—	—	—	—	—	2	—	—	—	—	—
Engorged veins	40	—	—	—	—	—	40	—	—	—	—	—
Tortuous veins	23	—	—	—	—	—	22	—	—	—	—	—
Buckled veins	36	—	—	8	1	—	35	1	6	2	—	—
Small petechial hemorrhages	16	2	2	3	3	2	11	1	3	—	2	2
Large hemmorrhages	8	2	2	2	1	—	6	2	4	—	—	—
Lymph exudate	5	—	2	1	—	—	7	1	4	—	—	2
Pigment changes	1	—	—	—	—	1	1	—	—	—	—	1
Perineural edema	5	—	—	—	—	—	5	—	—	—	—	—

Other findings:

1. Old retinal artery thrombosis, 1 in O.S.
2. Venous thrombosis, 1 in O.D. (upper temporal).
3. Cataracts: 14 bilateral, 1 in O.S., and 1 in O.D.

To turn for a moment to an analysis of the fundus findings (table 2) as recorded independently in each eye: Of the 100 cases, 28 were normal on the right side, while 29 were normal on the left; that is to say, the two eyes were normal in essentially the same number of instances. Those showing pathological findings were interesting for their various subsections. It will be seen in table 2 that each eye practically balanced with its fellow as to

the number of pathological manifestations; also that there was very little discrepancy except in the recorded number of small petechial hemorrhages, the left eye showing relatively more than those noted in the right. An explanation

TABLE 3

MEDICAL DIAGNOSES ASSOCIATED WITH ESSENTIAL HYPERTENSION

Diagnosis	Percent
Arteriosclerosis with hypertension	84
Myocarditis	29
Essential hypertension	16
Auricular fibrillation	5
Coronary thrombosis	6
Nephritis (secondary to hypertension)	2
Cerebral hemorrhage	7
Cerebral thrombosis	14
Subarachnoid hemorrhage	1
Presenile dementia	1
Syphilis	6

is offered which may account for such a result, in that the left common carotid artery comes off the aorta directly, whereas the right is the branch of the innominate artery. Thus, one would expect a greater arterial hydrostatic thrust in the left common carotid artery. Regarding the question of buckled veins: Fishberg and Oppenheimer[1] would have us believe that buckling, as such, does not exist, and that a pressure of the relatively more contracted artery exerts little, if any, influence upon the underlying venous wall. They claim that the impression conveyed through the ophthalmoscope is due to a displacement of the vein to a deeper or lower level within a retinal tissue. If one is to understand that these two types of vessels occur normally within a similar stratum it is rather difficult to understand how the veins can suffer such an alteration in tissue displacement. Again, as we so frequently noted in our observations, some of the most manifest instances of buckling took place in the vein less than a disc-diameter's distance from the disc margin. And if both the artery and the vein are, so to speak, anchored at one end, it would seem most improbable that a decompression at such a relatively short distance from the disc could be brought about. The statements of Foster Moore,[2] as well as the pathological work of Coats[3] and of Oatman,[4] with the various microphotographs illustrating actual buckling would support the stand we take in such an argument.

When very many manifestations of a pathological process have been observed in similar conditions, such as the occurrence of buckled veins and small petechial hemorrhages, naturally the recorded findings do not tally with the total percentage, for in many instances it was quite impossible to make an absolute record of each specific lesion. For the most part, hemorrhages and exudates were found in the

TABLE 4

TOTAL CEREBRAL ACCIDENTS, 21 CASES

	Left Eye		Right Eye	
Fundus Changes	Total	Percent	Total	Percent
Normal	6	28.6	6	28.6
Contracted arteries	13	61.9	13	61.9
Contracted arterial capillaries	1	4.8	1	4.8
Engorged veins	12	57.1	12	57.1
Tortuous veins	7	33.3	7	33.3
Buckled veins	9	43.6	10	47.6
Small petechial hemorrhages	3	14.3	1	4.8
Large hemorrhages	0	0	1	4.8
Lymph exudate	1	4.8	1	4.8
Pigment changes	0	0	1	4.8
Perineural edema	2	9.6	2	9.6

posterior part of the retina, relatively close to the nerve head, thus confirming the findings of Foster Moore.[2]

The medical diagnoses associated with the condition of essential hypertension speak for themselves (table 3). Because

of the verbal statement of Dr. J. C. Meakins, director of the Medical Clinic of McGill University, that in his experience cerebral accidents were for the most part associated with a normal fundus, we were led to examine these cases rather closely. Of our 100 cases, 21 might be classed as cerebral accidents; that is, cerebral hemorrhages or cerebral thromboses. From table 4 it will be found that in 28.6 percent of these cases there were normal fundi, which compares almost exactly with the number in the whole group of hypertensives. These two groups tally almost exactly except in two characteristics which are easily explained. Among the cases of cerebral accident a relatively great increase was found in the number of engorged, tortuous, and buckled veins, probably as a result of a general backing-up of venous blood caused by the increased intracranial pressure. In the whole group of primary hypertensives there were five cases of perineural edema; two of these were found in cerebral accidents, and are again probably the result of the increased intracranial pressure. It is interesting to note that in 11 cases of hypertension Larsson[5] found increased intracranial pressure in each. Such a condition would probably account for the perineural edema not associated with a cerebral accident.

It is interesting to draw a comparison between the cases which we have just had under discussion with a smaller series of primary nephritic cases which have been examined and recorded with regard to the same essentials that have already been noted in the former classification. The normal cases numbered 11 percent as compared with 29 in the left eye. It would at first glance seem to be inconsistent that a greater percentage of contracted arteries should occur in the nephritic than in the hypertensive cases. A possible explanation lies in the fact that in hypertensive individuals there is a much thickened arterial wall, due to the long and progressive

TABLE 5

PRIMARY NEPHRITIC CASES, 17 CASES

	Left Eye							Right Eye						
Fundus Changes	Total	%	Upper Nasal	Lower Nasal	Upper Temp.	Lower Temp.	Macular	Total	%	Upper Nasal	Lower Nasal	Upper Temp.	Lower Temp.	Macular
Normal	2	11.7	—	—	—	—	—	3	17.6	—	—	—	—	—
Contracted arteries	13	76.5	—	—	—	1	—	12	70.5	2	—	2	—	—
Contracted arterial capillaries	0	0	—	—	—	—	—	0	0	—	—	—	—	—
Engorged veins	7	41.1	—	—	—	—	—	7	41.1	—	—	—	—	—
Tortuous veins	4	23.5	—	—	—	—	—	5	29.4	—	—	—	—	—
Buckled veins	5	29.4	—	—	—	—	—	5	29.4	—	—	—	—	—
Small petechial hemorrhages	10	58.8	—	—	—	1	3	9	52.9	—	1	—	—	2
Large hemorrhages	6	35.4	1	2	—	1	—	4	23.5	2	2	1	—	—
Lymph exudate	9	52.9	1	—	1	1	1	9	52.9	1	—	2	—	2
Pigment changes	0	0	—	—	—	—	—	2	11.7	—	—	—	—	1
Perineural edema	8	47.1	—	—	—	—	—	8	47.1	—	—	—	—	—

existence of the disease, whereas, the nephritic patient is a younger person with more contractile arteries. Hence, contracted arteries would be more obvious in the former than in the latter. The frequency of engorged and tortuous veins is essentially the same in the two types of case. A manifest increase of buckling in the hypertensive cases is self-explanatory for the reason quoted above as well as for the greater tissue changes occurring in the arterial wall in the first class of case. The very evident increase of hemorrhages, both large and small, and particularly of lymph exudates, will be referred to at greater length in our discussion of the subject later. The tremendous difference in the occurrence of perineural edema in the two conditions is simply a manifestation of a generalized edematous process affecting all organs and all tissues as a result of nephritic disease. In the latter condition a meningeal edema results in an increase of cerebrospinal fluid, and therefore of increased intracranial pressure, which is transmitted along the optic nerve in the subarachnoid space.

Discussion

Regarding the problem as a whole, many theories have been propounded as to the pathogenesis of the various fundus changes. These have been summarized by Fishberg and Oppenheimer[1] in a recent paper, under five heads.

1. *Renal insufficiency:* Early investigators all believed that the retinal changes came as the result of renal dysfunction. Widal, Morax, and Weill[6] reported 17 cases all with nitrogen retention. However, this view is untenable, for great retinal changes can take place without renal damage.

2. *Retinal arteriosclerosis:* Von Michel[7] and other early workers believed albuminuric retinitis to be due to arteriosclerosis. This is not necessarily true as arteriosclerosis does not always exist in such cases. This was shown anatomically by Schieck.[8]

3. *Increased intracranial pressure:* Cushing and Bordley[9] were the first (1908) to describe a case of chronic renal disease with severe retinal lesions and a tremendously increased cerebrospinal-fluid pressure in 11 cases of hypertensive retinitis. However, we believe that the retinal changes instead of being caused by intracranial pressure are rather a corollary.

4. *Hypercholesteremia:* Chauffard, De Font-Réaulx and Laroche[10] were the first to bring this theory forward. However, it is not of general validity and we merely mention it to dismiss it.

5. *Arterial hypertension:* The sum total of all the work on arterial hypertension tends to show that the tissue changes in this condition are directly explainable on the basis of hypertension alone. It was pointed out by Traube[11] in 1870, that retinal lesions occur only in those forms of renal disease in which there is hypertrophy of the left ventricle. Fishberg and Oppenheimer, in a recent paper, have stated that not only is it always present, but that it precedes the condition. Gowers,[12] in 1876, was the first to point out that in hypertensive states the arteries of the retina are contracted. A number of workers since then have observed spasms of the retinal arteries in hypertension (Wagenmann[13] in 1897, Elschnig[14] in 1898, Labadie-Lagrave and Laubry[15] in 1906). Recently, Haselhorst and Mylius[16] (1928) not only observed but photographed cramplike and rapidly changing contractions of the retinal arteries in a patient with eclampsia gravidarum. After two days the contractions became more constant and involved longer stretches of the arteries. It was at this time that the first white degenerative lesions in the retina appeared.

This brings the whole problem into the realm of the rather revolutionary theories put forward by Ricker[17] some years ago. He believed that the underlying mechanism of both inflammatory conditions and hypertension is a neurovascular upset. In inflammatory conditions, bacteria or other stimuli at first set up a vasoconstriction of all terminal vascular segments. But the capillaries rapidly become fatigued and relax—a fatigue paresis exactly such as one sees after an overdose of adrenalin. Then a dilatation of capillaries results, with a sustained contraction of the arterioles, which must of necessity cause a slowing of the blood stream in the capillary bed; a condition which Ricker has called, depending upon its degree, *prestasis*, *peristasis*, and finally *stasis*, when no blood flows. Along with their dilatation the capillaries become more permeable, an effect possibly due to anoxemia or to the opening-up of stroma between the capillary endothelial cells. Krogh[18] has confirmed these latter changes. Thus, depending upon the degree of slowing of the blood stream and, therefore, of the capillary dilatation, there will be progressive degrees of exudate: first, plasma and fibrin only, then white cells, and finally red cells (three stages of stasis called by Ricker, liquor-stasis, leuco-stasis, and rubro-stasis, which correspond to his prestasis, peri-stasis and finally stasis).

Ricker believes that the same mechanism underlies hypertensive states. Hypertension is not caused by contraction of large arteries but of the terminal segments, the arterioles and capillaries. This has been proved by experiment. Adrenalin or sympathetic-nerve stimulation produce this effect. Finally, the capillaries become fatigued and dilate. Now we have the self-same condition as is seen in inflammatory conditions. The patient becomes decompensated, to use a clinical term, edema appears, white cells, and if severe enough, red blood cells appear outside the capillary well. It is interesting to note in this regard the findings of Haselhorst and Mylius[16] on eclamptics, mentioned previously. It is possible that these changes would only be seen at their best in young people whose vessels are essentially undamaged or unchanged by the normal aging processes (such as would be seen in our nephritic group). They would not be seen in old people who have had a slowly progressive hypertension, along with normal age-period changes which would make the vessels less reactive.

There is that group of cases which has been designated malignant hypertension. This is essentially an hypertension of explosive violence in a comparatively young person. Here one sees all the advanced retinal changes that are found in a primary nephritic, the only difference is that in the latter one knows the cause of the hypertension. Of course, in the malignant hypertensive case the neurovascular changes are not confined to the eye but involve the whole body and cause, among other lesions, cerebral edema, general anasarca, and rapid destruction of such parenchymatous organs as the kidney, as the result of the perivascular tissue changes. Hence, in these cases a nephritic factor is rapidly superimposed and maintains the hypertension (the *primary contracted kidney* of German nomenclature as opposed to the *secondary contracted kidney* resulting from a definite infective process).

With regard to the causation of hypertension in nephritis, there has been a tremendous controversy. Some say it is due to toxemia and others that it is due to a reflex neurovascular response. A very suggestive factor favoring the latter view is that in oxalate nephritis hypertension takes place if the renal nerves are intact. However, if one has completely denervated the kidneys before producing the ex-

perimental nephritis, hypertension does not take place. This interpretation is in accord with the old teleological hypothesis that hypertension in nephritis is due to the attempt of the body to force more blood through the kidneys.

In conclusion we should like to mention some findings in an entirely different field which might bear some relation to retinal changes. Menkin,[19] in 1934, showed that the expected cytological picture of an inflammatory exudate can be predicted from the pH of the tissues, and vice versa. For example, when the pH is on the alkaline side, polymorphonuclear leucocytes predominate, whereas if the tissue becomes more acid, mononuclear cells replace them and then finally become predominant. We would like to offer as a possible factor in the production of retinal exudate a change in tissue pH. We have shown that in nephritis, retinal exudates are more common than in uncomplicated hypertension. This is also true of diabetes. In both these conditions acidosis from time to time takes place.

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MICROSURGERY IN CHRONIC SIMPLE GLAUCOMA*

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The writer has recently reported an operative procedure[1, 2] for the relief of chronic simple glaucoma which consists of opening Schlemm's canal under direct magnified vision. This procedure removes the block to the circulation of intraocular fluid, which can be shown to be the mechanical cause of the increased intraocular pressure, and thereby restores to the intraocular fluid its physiological direction of outflow, instead of creating an abnormal outlet with the frequent complications and sequelae that may follow present-day operations. By means of a contact glass that has been devised for this special surgical purpose the operator can see the area of blockage and can watch and guide his instrument during the operation. The operative procedure when thus performed is without danger and its objective—namely, the opening of Schlemm's canal—can be deliberately performed with the trabeculum under full view. In those cases in which the trabeculum was incised over a sufficient extent, the intraocular pressure has returned to normal. According to observations during the last 1½ years the results show promise of being permanent.

In this article a variation of technique is suggested that will more certainly insure the opening of the canal. The original technique of operating under ×4 magnification affords a convenient range of some 20 cm. and a fairly wide field. Because of the moderate degree of magnification, however, one cannot be quite certain of always striking the canal and of opening it over a sufficient extent in all cases. In those cases in which the canal was insufficiently opened the intraocular pressure has been only partially reduced, and a later operation has been necessary to secure normal pressure. The technical variation suggested in this article consists of increasing the magnification from ×4 to ×20. This increase of magnification is obtained by using the binocular corneal microscope attached to the surgeon's head by means of a helmet (fig. 1). Although not easy of performance, the assurance of opening Schlemm's canal afforded by this higher degree of magnification may prove to be an improvement over the original technique in those cases where it is indicated.

Fig. 1 (O. Barkan). Photograph showing the use of the binocular corneal microscope in the author's operation of opening Schlemm's canal under direct vision.

Microsurgical technique of opening Schlemm's canal under direct vision. The surgeon wears a helmet to which is attached a binocular corneal microscope. He helps to steady the microscope with his left hand which, in turn, by means of a finger, keeps in contact with the patient's head. A trained assistant, standing behind the patient's head for the left eye and at his right side below the head for the right

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eye, secures the bulbus at the temporal limbus with a small Elschnig forceps held in his right hand. With his left hand he steadies the surgical contact glass by means of a double-pronged probe which fits into two depressions on the convex surface of the glass. A second assistant guides the narrow beam of the hand lamp from across the bridge of the patient's nose to transilluminate the nasal portion of the limbus and the corresponding region of the angle of the anterior chamber. The surgeon supports and focuses the microscope with his left hand while he guides the knife with his right hand. He sits on a stool adjusted to such a height that by means of a slight movement of his head his gaze may be directed first at the limbus and then transferred above the temporal edge of the contact glass to the anterior chamber, from which point he continues to guide the knife across the chamber by direct vision through the glass. When the blade reaches the highly magnified angle its point is inserted exactly into that portion of the trabeculum which covers Schlemm's canal and the incision is continued for several millimeters along this line. That this may be accomplished with a high degree of certainty and exactitude is proved by postoperative biomicroscopic examination of the angle, which shows a single straight dehiscent slit of the trabeculum opening Schlemm's canal. What appears to be the glistening-white inner lining of the opposite side of Schlemm's canal is clearly visible through this longitudinal bisection of its wall. (The sclerocorneal trabeculum may be found to be bisected or sometimes torn off, constituting what may be called either a trabeculotomy or trabeculectomy as the case may be.) The working range is 6 cm. from the patient's eye to the tip of the objective, or 20 cm. from the patient's eye to the eye of the surgeon. The surgeon keeps the image in focus by shifting his head and makes the finer adjustments with the sliding scale of the microscope, for which the fingers of the left, steadying hand are used.

The binocular corneal microscope has in the past been used by many ophthalmologists for the removal of foreign bodies from the cornea. This procedure has been found satisfactory in routine practice, the patient sitting upright with his head on the chin rest. Recently Schoenberg[3] has suggested its use for intraocular surgery, and reports attaching the head of the corneal microscope to a stand on a table at the side of which the patient is lying, in order that it may be used in the course of surgical operations. He suggests that various uses are possible but does not, as far as can be gathered from reading his article, report having actually applied it to intraocular surgery nor proved its practicability for this purpose. Before reading his article such a use had occurred to me for my microgonioscope,[2] which consists of a binocular microscope mounted on a highly flexible stand. However, the semirigidity of even this very flexible apparatus renders it unsatisfactory for purposes of intraocular surgery. It was for this reason that I removed the microscope head from its stand and attached it to the surgeon's head, where, with the additional steadying influence of the surgeon's hand, which maintains contact with the patient's head, it works out satisfactorily. Contact with the patient's head is found to be necessary if one considers that the slightest movement between microscope and object is magnified 20 times, and if one further takes into account the narrow breadth of focus and realizes that the limited field of vision when using the ×2 objective and ×10 ocular combination is only 6.9 mm. in diameter.

Conclusion

Examination of the living eye with the binocular corneal miscroscope is customarily called biomicroscopy; examination of wet specimens of the eye with the same instrument has been termed microanatomy.[4] To operate within the living eye with this technique may be aptly termed intraocular microsurgery. As far as could be judged from a review of the literature, this is the first time that such high magnification has been applied in intraocular surgery.

The use of the binocular microscope, although it demands deliberate care and trained assistance, is feasible and may prove to be the procedure of choice when operating on Schlemm's canal under direct magnified vision in those occasional cases where extra assurance of striking the canal is required.

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TRACHOMA IN AMERICAN SAMOA*

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HISTORY AND EPIDEMIOLOGY

No consistent statements concerning the time or place of origin of this very prevalent eye disease in Samoa can be obtained from natives. The origin is usually connected with various physical or emotional experiences, as is common among primitive peoples. For example, one village considered the disease a scourge visited upon them as a punishment by God for the faithlessness and false oaths of some chieftain. An increase in eye disease was noted in August, 1905, and attributed to a volcanic eruption on the island of Savaii.[1] Early missionary writings indicate that eye diseases were endemic when contact with the white man was first made.

Leber and Prowazek[1] described a clinical entity, which they called "Epitheliosis desquamativa conjunctivae," as a result of studies made in the course of an expedition to Western Samoa in 1910. They described a similar disease in New Zealand among the Maori and on the Tonga Islands. It was also considered endemic in Fiji. Since then physicians in these places have failed to adopt this name, and the presence of trachoma has been established. These authors gave an excellent description of the endemic eye disease and called it a new clinical entity. They recognized three stages, as follows:

Stage 1. In this stage the palpebral conjunctiva was diffusely thickened without loss of smoothness and luster. A thin, not very profuse, slightly milky secretion rich in epithelial cells was noted, and this inspired the name assigned to the disease. Inclusion bodies of the Halberstaedter-Prowazek type were demonstrated in epithelial scrapings.

Stage 2. In this stage the thickening of the conjunctiva palpebralis increased, the surface lost its luster and smoothness and took on a velvety appearance. Rarely did this hypertrophy proceed to the stage of numerous follicular swellings. This absence of numerous follicles was considered a differential point in distinguishing it from trachoma.

Stage 3. The third stage was that of advanced atrophy of the conjunctival epithelium. The atrophic processes, which began during the second stage and were first limited to small areas, spread diffusely over the entire conjunctival surface. The blood vessels became decreased in size and number. The cornea was frequently ulcerated during the second and third stages, and adherent leukomata, corneal staphylomata, and phthisis bulbi were frequently seen as a result. Trichiasis, entropion, and symblepharon were common sequelae. The similarity to trachoma is admitted by these authors but no convincing differentiation is made. The presence or absence of pannus is not mentioned. It is submitted that the above description is not inconsistent with the picture of trachoma.

Naval medical officers stationed in American Samoa have been calling the prevalent eye diseases "Samoan conjunctivitis." Lieutenant Commander A. G. Wenzell, in 1933, recognized the frequency of Koch-Weeks bacillus infections and considered "Samoan conjunctivitis" to be identical with acute

*The opinions and assertions contained herein are the private ones of the writer and are not to be construed as official or reflecting the views of the Navy Department or of the Naval Service at large.

infectious conjunctivitis. The first written reference to trachoma in American Samoa occurred in 1910, when two patients were detained by the quarantine officer. In 1934 Commander H. C. Weber, a qualified eye specialist, examined 2,581 natives and found that 2,117, or 82 percent, showed evidence of trachoma.[2] Commander C. S. Stephenson in the previous year estimated that at least 10 percent of Samoan eyes showed a condition that would probably be diagnosed trachoma.[3]

Factors which may have a bearing on the eye diseases seen are numerous flies with which it becomes very difficult to cope during the bread-fruit season. The fallen bread fruit act as breeding places for flies, and it is well known that ocular diseases become epidemic during this time. The following diseases are also endemic: yaws, filariasis, and intestinal parasites, but no definite relationship to the equally prevalent eye diseases could be demonstrated.

Clinical description

The classification of MacCallan[4] was found serviceable in the diagnosis and study of trachoma in Samoa. The criterion of diagnosis in all cases was the presence of pannus. Mere inflammatory states of the conjunctiva were ignored for statistical purposes, for reëxamination at a later date often showed the same eyes to be normal.

In MacCallan's stage 1, the presence of punctate follicles together with pannus was considered diagnostic. Relatively few diagnoses of trachoma 1 were made because of the difficulty of demonstrating pannus macroscopically in this early stage. A slitlamp microscope was not available. This stage is also probably transient and occurs mainly in infants and young children in heavily infected countries.[4]

In trachoma 2, the vast majority corresponded to MacCallan's trachoma 2b′ which is defined as a papillary hypertrophy of the palpebral conjunctiva. This is also called velvety hypertrophy. Scattered follicles were seen, but rarely were they in sufficient numbers to justify a diagnosis of trachoma 2a. No cases of associated vernal catarrh (trachoma 2b″) were seen. Three cases showing fulminating palpebral conjunctival hypertrophy, chemosis, and purulent discharge were seen by the author during 21 months, although many more similar cases were reported by field workers. One of these, occurring in a child aged five years, showed numerous gram-negative intra- and extracellular diplococci which were morphologically gonococci. The other two failed to show organisms in repeated smears. It is questionable whether the diagnosis of trachoma 2c (trachoma associated with gonococcal infection) could be applied in these cases. In the stage of trachoma 2, pannus could usually be seen with the naked eye or at least with the loupe.

In trachoma 3 cicatrization was seen on the palpebral conjunctiva, at first as fine lines and later as larger bands alternating with hypertrophied conjunctiva. At times a lattice- or lacelike effect was produced. In older individuals almost complete fibrosis of the conjunctiva with islands of hypertrophy was common. Arlt's line, a band of scar tissue parallel to the lid margin, was common. Shrinkage of the fornix was noticeable, but marked symblepharon was rare. Herbert's peripheral pits were occasionally seen in trachoma showing well-marked antecedent or present lid activity. Posttrachomatous degeneration with calcareous deposits in the deeper tissues was also seen. Tarsal changes ranging from marked enlargement and thickening to almost complete fibrous replacement and atrophy were noted, and entropion and trichiasis were common sequelae. Tra-

chomatous ptosis, narrowing of the palpebral fissure, sinuous lid margins, and corneal changes were frequent. The corneal changes included superficial keratitis, large central ulcerations, and adherent leukomata. Phthisis bulbi, usually the result of perforating corneal ulcers, was the commonest cause of blindness.

Trachoma 4 indicates complete arrest of the disease as shown by absence of all hypertrophic changes in the conjunctiva. In mild cases the diagnosis was indicated by the presence of almost indiscernible palpebral conjunctival scars and macroscopically avascular pannus at the upper limbus. In severe cases, practically all of the conjunctiva palpebralis was replaced by scar tissue, and the cornea showed scars from antecedent ulceration. A shiny bluish tarsal conjunctiva, giving the impression of being stretched or thinned, was characteristic of arrest in a late stage.

Pannus. Uncomplicated vascular pannus was the type usually seen in trachoma 2. This lesion consisted of a raised gelatinous infiltration of the upper limbus. It was somewhat opaque near the sclera and gradually became more translucent as it extended onto the cornea. The peripheral margin was wavy and irregular, suggesting an advance in the path of least resistance. This gelatinous tissue, which seemed to be just under the corneal epithelium, was traversed by small blood vessels from the limbus. These vessels were for the most part fairly straight in contrast to the wandering dichotomously branching vessels seen in superficial keratitis. The degree of density and amount of corneal invasion of the pannus seemed to be proportional to the severity of the lid infection in most cases. After a time, it was possible to predict the severity of the lid lesion by looking at the pannus. As the lids improved, the pannus became less vascular and the translucent corneal margin receded toward the limbus. Finally, only the opaque residue, which I shall call avascular pannus, remained. Under treatment it took at least three months to effect this transition. No cases were seen in which this type of pannus extended to the pupillary area. The width of this pannus varied, but seldom exceeded four millimeters.

Macroscopically avascular pannus consisted of a semilunar opacity of the upper limbus and probably represented fibrosis of Bowman's membrane, due to antecedent vascular pannus. This is suggested by the results of pterygium operations. If a deep corneal incision is made while excising the tip of a pterygium in performing a McReynold's transplant, the cornea heals without opacity. After superficial excision, however, there may be opacities due to proliferation of remnants of Bowman's membrane. It is probable that remnants of blood vessels could be demonstrated by the slitlamp in this type of pannus.

In diagnosing avascular pannus, arcus senilis and overhanging scleral edge must be ruled out. When the ring of arcus senilis is complete there is no difficulty, but if only a segment is present at the upper limbus it may be confusing. The distinguishing feature of such a segment is an area of clear cornea between the limbus and the opaque area.

Normally, there is an obtuse angle between the corneal curvature proper and its peripheral portion, where it merges with the sclera. This peripheral segment is usually about one millimeter wide but may be broader in some portion and narrower in others. It is in this segment that opaque scleral fibers merge with clear corneal fibers. When this segment contains many opaque fibers and is quite wide it is called an overhanging scleral edge. A distinguishing feature of this opacity is that it is more opaque in the

deeper layers and clearer superficially, because the scleral fibers pass farther into the cornea near Descemet's membrane than near Bowman's membrane. Millet's lunula probably represents an asymmetrical overhanging scleral edge, which may be more marked in some races. Avascular pannus is distinguished from overhanging scleral edge in that it is more superficial and extends beyond the angle formed by the main curvature of the cornea and its peripheral segment. The width of this type of pannus varied with the severity of the preceding vascular pannus but averaged 2 to 3 millimeters.

A third type of pannus, which I called complicated pannus, was recognized. This was seen in eyes showing marked lid reaction and profuse discharge in addition to the usual pathognomonic signs of trachoma. Secondary infection could usually be demonstrated in these cases. Extensive invasion of the cornea by blood vessels and corneal cloudiness was characteristic. The blood vessels were of the superficial, wandering, dichotomously branching type and often invaded the pupillary area. The corneal cloudiness was superficial and usually mottled. Ulceration of the cornea was not uncommon. This form was really considered to be more of a superficial keratitis superimposed on the usual uncomplicated vascular pannus previously described. The gelatinous infiltration and shorter straighter vessels of the latter could usually be seen at the upper limbus through the more pronounced lesions. This type of pannus was the rule in trachoma complicated by chronic dacryocystitis. Much of this infiltration was found to be reversible, as was seen when a dacryocystectomy was performed in cases of trachoma complicated by chronic purulent tear-sac infections. The corneal cloudiness and blood-vessel infiltration also cleared to gross inspection when appropriate treatment for secondary infection was instituted in cases not complicated by chronic dacryocystitis.

Prevalence of trachoma

The prevalence of eye diseases in American Samoa can be appreciated by the records of the number of cases treated. Since a great many treatments were necessarily administered by hospital corpsmen, the accurate diagnosis and laboratory classification of the various forms of eye disease were impractical. For statistical purposes they are grouped together under the title of Conjunctivitis. Field workers in 1936 were instructed in the diagnosis and treatment of trachoma and reported undoubted cases as such. If there was any question, they were grouped with the conjunctivitis cases. The following data show the number of cases treated annually for the years indicated:

Years	*Conjunctivitis*
1933	1,182
1934	1,674
1935	2,673
1936	3,638 and 1,547 cases of trachoma

The apparent increase in the number of cases since 1933 represents an increase of interest in the Naval Administration method of treatment rather than an absolute increase.

Various groups from widely separated areas showed considerable variation in the prevalence of trachoma. The lowest percentage occurred in the Brother's School, where 28 percent were infected.[7] Of this number more than half were inactive cases; that is, only the residuals of trachoma remained. There were 117 pupils and the average age was 14 years. This school required tuition and was attended by a fairly select group of boys. As might be expected, the incidence of trachoma in such an economically favored group was lower.

Out of 336 individuals examined in various groups and ages, 147 showed evidence of either having or having had trachoma. This represents a percentage of 44, which is considered a fairly accurate index of the general incidence. Many more cases were, of course, seen, but statistical studies were not undertaken until the author felt he could distinguish trachoma from the other prevalent ocular infections.

The following table shows the types and stages of trachoma seen:

LEONE BOYS' SCHOOL
105 Boys Aged 6-16 Years.

Trachoma 1.	11
Trachoma 2.	13
Trachoma 3.	11
Trachoma 4.	8
Total	43 or 41 percent.

At a clinic conducted on Swain's Island,[5] a small isolated island near Samoa, 17 cases of trachoma were found among 40 individuals who presented themselves for annual medical treatment. None complained of eye symptoms and 10 showed no recent lid activity. This is interesting in that no treatment was used and shows a tendency to spontaneous arrest.

The incidence of trachoma in Samoa compared to that in other countries is interesting. Egypt heads the list with 94 percent. Other heavily infected countries are:[6]

	Percent		*Percent*
Japan	10-15	South Manchuria	41
Formosa	40	Cochin China	55-70
Korea	16	Poland	30-36

COMPLICATIONS

The Samoan is a stoic Polynesian and accepts illness very casually. Little attention is paid to the prevalent eye diseases in their mild form, and often symptoms are denied when the eyes show obvious active infection. It is only when complications have set in that treatment is considered. For these acute flare-ups the treatment is usually heroic. Infusions of various herbs or fruit juices may be tried first or the method of scarification may be resorted to immediately. The latter consists of abrading the cornea, usually with a variety of sword grass or strands of sennet. The effect of this treatment is to promote an intense hyperemia which, of course, favors healing, but unfortunately the cornea is too often opaque when this occurs. The great number of large corneal scars is in a large measure due to this drastic treatment. Apparently the contagiousness of the disease is not realized, for no precautions are taken.

In 16 months 532 cases of trachoma were treated at the eye clinic conducted at the Naval Dispensary by the author. Two thousand eighty-nine treatments were administered, or an average of five treatments per patient, the majority of whom presented themselves for secondary infections, corneal complications, or sequelae. Of these 37 had chronic purulent dacryocystitis, 56 had entropion-trichiasis, 38 had corneal leukomata, and 6 had corneal staphylomata.[7, 5] Uncomplicated trachoma was usually considered too trivial to warrant the nuisance and pain of treatment.

The following operations were performed for these complications at the Samoan Hospital:

Dacryocystectomy	30
Entropion	45
Tattooing of cornea for disfiguring scarring	24
Pterygium	55

Pterygium operations are included because it is felt that the chronic irritation produced by trachomatous lids favors the development of pterygium. Most patients with pterygium also had trachoma. It is believed that most of the blindness is due to either secondary infection or the drastic native treatment administered. The tendency of simple trachoma

to spontaneous healing has already been mentioned.

Laboratory findings

Laboratory investigation of these eye diseases showed the presence of Koch-Weeks bacilli, Morax Axenfeld bacilli, staphylococci, and diphtheroids. Koch-Weeks bacilli were the most frequent organisms found in cases showing profuse ocular discharge. Angular conjunctivitis, characterized by hypertrophy of the caruncle and plica semilunaris, a slight discharge consisting mostly of desquamated epithelial cells, and itching of the tissues about the inner canthus, was common. Morax Axenfeld bacilli could usually be demonstrated in smears of the secretion or epithelial scrapings. It is possible that this condition led to the diagnosis of "Epitheliosis desquamativa" by the German commission in 1910, although they also recognized the presence of Morax Axenfeld infections. This type of infection was sporadic but widespread while the Koch-Weeks infections were often seen in mild epidemic form. These were the two most common secondary invaders of trachoma although they frequently occurred in nontrachomatous cases. The Morax Axenfeld bacilli were usually seen in older individuals while Koch-Weeks infections were more common in children.

Doctor I. A. Bengtson of the National Institute of Health reported typical inclusion bodies of the Halberstaedter-Prowazek type in epithelial scrapings taken from active trachoma cases. Dr. R. D. Lillie of the same institution examined 11 tarsi removed for entropion and reported: "In most of the fragments the process is apparently very chronic, only one showing lymphoid follicles and relatively acute changes." Individual reports of some of these tissues are as follows:

"S-7029. Strip of dense fibrous tissue containing fat and few tarsal glands of sebaceous type, partly naked scar on surface, partly covered by pavement, low squamous or tall stratified transitional epithelium, mucosa with the last irregularly and moderately to densely infiltrated by lymphocytes. Few small subsurface cysts lined by epithelium.

"S-7031. Strip of fibrous areolar tissue with occasional tubular gland, one end densely scarred with small patches of stratified squamous epithelium adherent to the scar.

"S-7032. Strip of fibrous areolar, dense fibrous and fatty tissues without glands, conjunctiva or cellular exudative reaction."

Prevalence of blindness

In 1923 Captain Hunt reported 454 cases of blindness, 86 of which were bilateral. The estimated population at this time was 8,184. This would represent 1,050 cases of bilateral blindness per 100,000 population. Palestine is usually credited with the highest percentage of blindness, which is 843 per 100,000.[4] A similar survey made in 1933 by Commander C. S. Stephenson, showed the following results:

Blindness:

Right Eye	Left Eye	Bilateral	Total	Male	Female
108	120	68	296	107	189

Twelve percent of the blindness was attributed to injury and the rest to disease. In terms of number of cases of bilateral blindness per 100,000 population, the figure is 680, representing a decrease of 370 in one decade. It is hoped that this reduction is largely due to abandonment of the ancient custom of abrading the cornea in the treatment of eye disease, and the substitution of appropriate modern medical treatment as advocated by the Naval Administration. The widespread

use of silver protein, and lately of weak zinc-sulphate solution no doubt at least helps to reduce the secondary infections which are largely responsible for the complications resulting in blindness. In countries where trachoma is not common, as in Holland, Germany, France, and England, the number of blind per 100,000 ranges from 56 to 73. It is hoped that such low figures will eventually be attained in American Samoa.

Conclusions

1. The prevalence of trachoma in Samoa is established by clinical and laboratory investigation.

2. Samoan trachoma has a tendency to spontaneous arrest unless complicated by secondary infection, which causes a high percentage of blindness.

3. A simple clinical classification of pannus based on macroscopic examination is suggested.

The studies reported above were made possible by the encouragement and cooperation of Commander C. R. Riney, Public Health Officer of American Samoa, and the advice and help of Surgeon C. E. Rice, U.S.P.H.S.

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A CYST OF THE POSTERIOR CHAMBER WITH A MICROSCOPIC STUDY OF THE EYE*

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The appearance of intraocular cysts after a perforating wound of the globe, particularly when the injury is in the ciliary region, at or near the limbus or through the cornea, is frequently mentioned in the literature.

The Buhl-Rothmund theory[1] of migration of conjunctival or corneal epithelium through the wound to some part of the uvea is still accepted as the best explanation of the development of these cysts. Depending upon where these epithelial cells are finally engrafted, such a cyst may form on the anterior surface of the iris, in the stroma of the iris itself or on its posterior surface, or in the ciliary body. The cyst is then covered with pigment cells of the retinal pigment layer, giving it a rusty brown appearance; in the early stage it may easily be mistaken for a melanosarcoma. The true cyst has a thin wall lined with epithelial cells, is translucent, and is filled with fluid of varying consistency. The shape of the epithelial cells, whether flat, squamous, or cylindric, depends upon the amount of pressure exerted upon these cells by the fluid within the cyst.

Treacher Collins correctly termed these growths epithelial cysts, in contradistinction to those arising spontaneously from the uvea, which he classified as endothelial cysts. If particles of skin or hair enter the eye, a firmer tumor of epidermoid cells is formed; namely, a pearl cyst, cholesteatomatous or granulomatous in character. Such tumors are usually found in the anterior chamber. Posterior-chamber cysts are sufficiently rare to justify the following report.

CASE REPORT

On November 26, 1925, J. W., male, aged 12 years, was brought to the Lenox Hill Hospital with a clean cut through the sclera of the right eye caused by a toy propeller. The wound extended from the limbus, at the 7-o'clock position, about 10 mm. downward and outward, exposing the ciliary body, with a slight separation of the iris (iridodialysis). No prolapse was present. There was some blood in the anterior chamber. The lens was undisturbed. One silk conjunctivoscleral suture sufficed to close the wound, which healed promptly. The boy was discharged from the hospital one week after admission. He was kept under observation for six months, and except for the iridodialysis, recovery was complete, with vision of 6/9.

Nine years later, on October 29, 1934, he returned because of pain in this eye. Examination revealed a cyst behind the iris, in the lower temporal quadrant, between the 6- and 8-o'clock positions, pushing the iris forward but apparently not disturbing the lens. Vision was still 6/9 with correction. The cyst was brownish in color, translucent upon transillumination, and seemingly was not attached to the iris, as the pupil could be well opened with atropine. The media were clear (fig. 1).

On November 4th the cyst showed an increase in growth and there was a smaller cyst below it. The tension of the eye was 15 mm. Hg Schiötz, against 20 mm. Hg Schiötz, for the left normal eye. The cyst grew rapidly, and the patient was admitted to the hospital on November 14th. On November 15th, under local

*Read before the American Ophthalmological Society, at Hot Springs, Virginia, in June, 1937.

anesthesia, following the method of Safar,[2] who reported successful treatment of a cyst with electrocoagulation, a narrow iridectomy was performed below, exposing the cyst; a single needle electrode was easily introduced into the eye, the cyst was punctured, and the current turned on to 35 milliamperes and kept there for ten seconds. The cyst disappeared. When dressed, the eye showed considerable reaction, but no tension, and by December 3d it had quieted down, there was no sign of the cyst, but already there was evidence of beginning cataract. The patient was kept under observation. Tension was never above 18 mm. Hg Schiötz, and on January 14, 1935, two months later, the cataract was removed. Recovery was uneventful. The vision, with cataract glass, +10.00 D. sph. ⊂⊃ +4.00 D. cyl. ax. 180°, was 6/12.

On May 15th the patient returned saying that he had struck his eye with his elbow. There was some subconjunctival hemorrhage, a slight bulging of the old scleral scar, and a remnant of the cyst could be seen in the angle of the posterior chamber. Tension was 18 mm. Hg Schiötz. The patient was kept under observation, the vision of the eye remaining at 6/15.

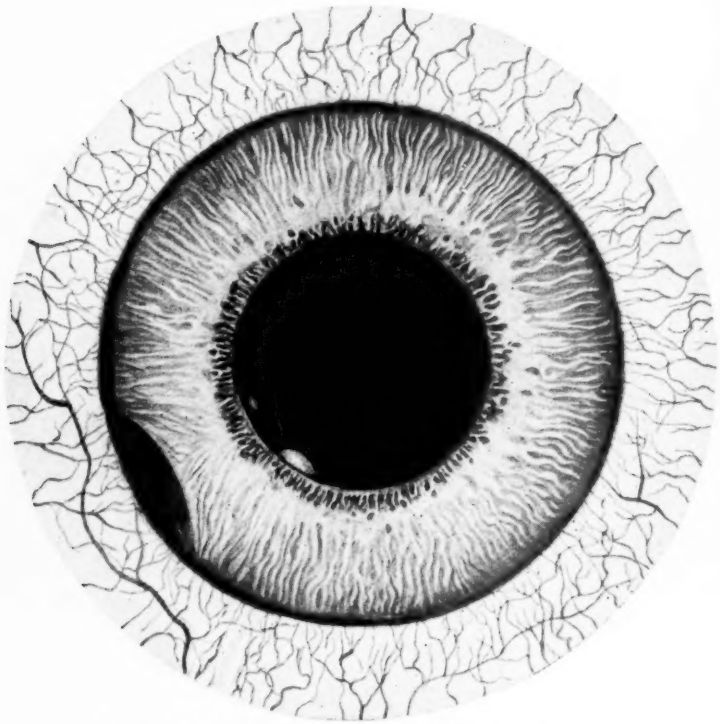

Fig. 1 (Krug). Appearance of the eye when first seen.

On September 12th a slitlamp examination showed no evidence of recurrence; one could see the remnant of the brown cyst wall deep in the posterior chamber; there were no blood vessels to be seen in this pigmented mass. The eye was quiet.

I did not see the patient again until January 11, 1936, when a secondary membrane had formed in the pupil. The vision had decreased to 6/60. The patient was seen by Dr. Arnold Knapp, who verified

my observation that the cyst had disappeared.

By May 12th, 18 months after the first operative interference, the cyst had reformed (fig. 2), and the patient was admitted to the hospital for a second electrocoagulation. This again seemed to be successful, for the cyst disappeared (there

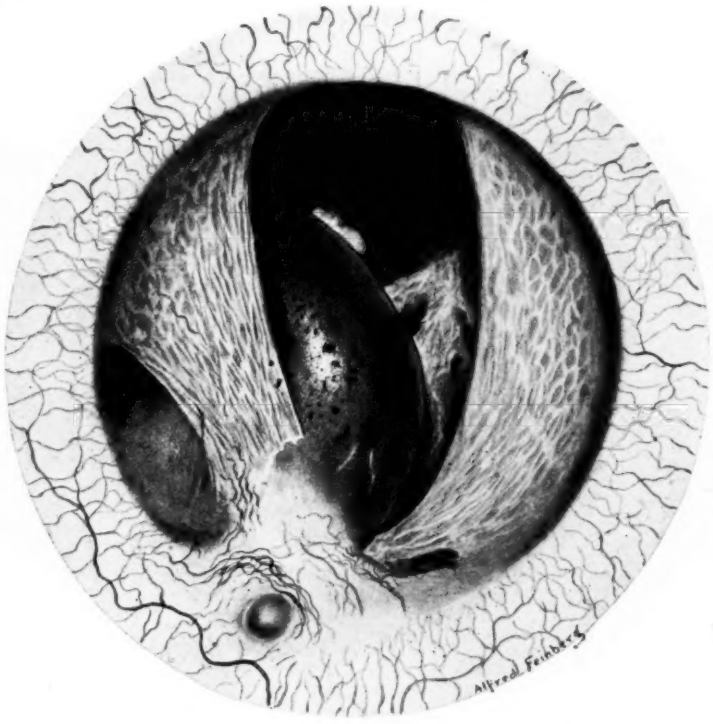

Fig. 2 (Krug). Recurrence after operation.

was less reaction after this operation than after the first one); the vision did not improve beyond 6/60.

By July 10th, however, the cyst had reappeared, growing very rapidly, invading the anterior chamber, with increase in intraocular tension to 50 mm. Hg Schiötz. Considerable pain and discomfort were present. The patient himself requested the removal of the eye, as his left eye had become sensitive, although there was no evidence of sympathetic inflammation. The eye was removed on July 16th.

I am indebted to Dr. Bernard Samuels for the following report:

Globe. The specimen consisted of sections of an eye of normal size, but of irregular contour, caused by an intercalary staphyloma on one side (fig. 3).

The cornea was widely separated from the scleral spur by a defect which was filled out by a rather loose ordinary connective tissue containing many blood vessels and a small oval plug of epithelial cells. The anterior surface of the staphylomatous area was of smooth and regular outline, but the contour of the posterior surface was very irregular. The sclera showed nothing remarkable.

The cornea revealed a scar running through the entire layer, situated below the center of the limbus, on the side opposite the staphyloma. The scar ran practically parallel with the anterior surface of the iris.

The anterior chamber was abnormally deep. The angle on the side of the corneal incision was well rounded. On the side of the staphyloma there was no evidence of the pectinate ligament. Here a large rounded angle was bounded externally by the tissue of the staphyloma; this angle was filled out by an epithelial cyst which occupied almost this half of the anterior chamber.

slight recession. The vitreous body was not present in the sections.

Some remnants of the lens substance were seen lying between the collapsed capsule. At one point a small amount of free lens substance was distinguishable in the anterior chamber. This rested posteriorly on a membrane composed of elongated cells, suggesting the lens epithelium.

Description of cyst. The cyst was lined

Fig. 3 (Krug). Cross section of the eye.

The ciliary body on the side opposite the staphyloma was well preserved. There was marked atrophy of all structures in the neighborhood of the staphyloma. The processes were drawn out toward the median line by a cyclitic membrane adjacent to the staphyloma (figs. 4 and 5).

The choroid showed marked congestion. The retina was *in situ,* and the various layers were fairly well preserved. The optic nerve was covered by a thin glial membrane. The cribriform fascia showed

with stratified epithelium. This in places showed the characteristics of the epithelium of the limbus, the basal cells being low and hyperchromatic, just as were the basal cells of the solid plug of epithelium referred to as lying between the cyst and the surface epithelium.

Facing the anterior chamber the bulging wall of the cyst was extremely delicate. The epithelial cells of the growth lay directly on a very attenuated pigment layer derived from the pigment layer of

Fig. 4 (Krug). Microphotograph of the section.

the posterior surface of the iris, and from the pigment layer of the elongated and compressed ciliary processes. The content of the cyst, so far as was retained, consisted of a clear, highly albuminous fluid. The thin wall of the cyst was supported by the cornea, by the staphyloma, by the iris, by the capsule of the lens, by the ciliary processes, and by the anterior surface of the ciliary body. In a few places within the epithelium of the wall small cysts had developed.

Fig. 5 (Krug). Microphotograph of the section.

Diagnosis. 1. Staphyloma, intercalary. 2. Epithelial implantation cyst in posterior chamber.

Discussion

The cyst is unquestionably of the type caused by the implantation of conjunctival or corneal epithelial cells at the time of the trauma, although one could not, from the study of the sections, definitely determine the exact site of origin.

It is difficult to explain the covering of the cyst with pigmented epithelium unless we assume that, in its growth, the cyst gradually stripped the posterior layer of the retinal pigment from the iris, which was followed by stretching and proliferation of these cells.

Collins and Mayou[3] speak of cysts formed by the separation of the two epithelial layers lining the ciliary body. These observers state that these cysts have an outer wall of pigmented and an inner wall of unpigmented cells.

At the meeting of this Society in 1933 Tooker[4] reported an identical case with an excellent study of the sections of the enucleated eye. Villard and Dejean[5] published an exhaustive review on the subject in 1933, with 230 references. They subdivided traumatic cysts clinically into pearl cysts and serous cysts. Serous cysts were again divided, depending on whether they were epithelial (ectodermic) or endothelial (mesodermic) growths. Griscom,[6] in 1928, reported a cyst appearing fourteen years after injury. Wilmer,[7] in 1928, reported before this Society a cyst of the uveal layer of the iris.

As to treatment, complete excision promises the only positive cure. Excision is difficult when the cyst is in the posterior chamber. Electrocoagulation failed in my case, and I may be criticized for not applying some other form of treatment, such as the injection of weak phenol or iodine after evacuation of the cyst fluid or the use of the X ray. Handmann[8] reports complete regression after roentgenotherapy, as does also Custodis,[9] who, on the basis of his survey, concludes that traumatic cysts are caused by the behavior of the implanted epithelium. He reports a final cure after two roentgen irradiations.

In my case success seemed certain. The patient was free from any evidence of recurrence for eighteen months. Within two months after the second treatment by electrocoagulation the cyst reappeared. Very rapid growth, the development of secondary glaucoma, and irritability of the fellow eye justified enucleation.

The development of intraocular cysts after trauma is always a serious complication, and too frequently terminates in the loss of the eye. The experimental implantation of epithelium into the anterior segment in order to prove that the cyst's formation is the result of the behavior of the epithelial cells has not met with success as regards the formation of a true cyst.

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Discussion

Dr. F. H. Verhoeff, Boston: Apparently it is technically correct to speak of this as a cyst of the posterior chamber, although the cyst did not originally occupy the posterior chamber. It is unfortunate that this title had to be used, because it gives a wrong impression; namely, that the case differs from that of a cyst in the anterior chamber following a perforating wound. I can recall three cases in which I have operated for epithelial cyst of the anterior chamber. The results were successful in all three. One of the cysts occurred after an extracapsular operation for cataract. The growth was situated in front of one pillar of the coloboma and was not very large. I excised the cyst, sutured the wound, and examined the tumor microscopically. It proved to be an epithelial cyst. It is hard to believe that I could have removed it completely, but there has been no recurrence after several years. In another case, that of a boy, a cyst developed in the anterior chamber after a linear extraction for high myopia. I removed the cyst, and there has been no recurrence. In the third case two cysts developed at the site of a very serious wound at the corneal limbus, but at the time I considered that the eye was in good enough condition to allow it to remain in spite of a traumatic cataract. Sympathetic uveitis developed, but responded to treatment with diphtheria antitoxin. About a year later, I removed the cysts, which, on microscopic examination, proved to be epithelial. I am sure that I could not have removed all the epithelium from the eye, but there has been no recurrence. The patient, a young boy, now has vision of 10/200 in the injured eye, and 20/15 in the other.

The point I wish to make is this: that in such cases it is well worthwhile to attempt to remove the cysts, even if we do not succeed in excising all the epithelium. I believe that the eye can harbor a certain amount of it—possibly as a result of the operation the epithelium is incarcerated in scar tissue so that it does not proliferate.

Dr. Theodore L. Terry, Boston: That the author has used the term "epithelial cyst of the posterior chamber" is of some importance, because it shows that an implantation epithelial cyst can extend into the posterior chamber.

In examining the sections in the laboratory of the Massachusetts Eye and Ear Infirmary two instances of epithelium in the posterior chamber were found, a coloboma of the iris being present in each. No case of epithelial cyst in the posterior chamber was discovered however.

In Dr. Krug's case it is interesting to note that the epithelium lining the cyst varies greatly in the number of its layers. Although this is not necessarily important, the fact that the epithelium is reduced to one or two layers in that region of the cyst exposed to the aqueous, and that the central area of this free portion shows necrosis of the epithelium, may indicate that the aqueous does not bring it sufficient nutrition or that there is some growth-retarding factor in the aqueous. This behavior of the aqueous, I believe, has been suggested by those who are particularly experienced in corneal grafting. This is further borne out by the fact that in other localities it is possible to find blood vessels in contact with the cyst.

In view of Dr. Verhoeff's observations, attempted removal would apparently be a worthwhile procedure; however, the size and nature of this cyst would have made complete removal very difficult, or more probably impossible.

Dr. Arnold Knapp, New York: May I speak on the question of treating a cyst of the iris by electrocoagulation? This patient I wish briefly to refer to was a woman operated upon for a cataract a year before we saw her, and when she came to us she had a broad adhesion of the iris and of the capsule to the section, a well-developed iris cyst, and increased tension. The cyst was treated by electrocoagulation in the usual manner, and the result was very favorable for eight months. After that time the tension returned; it was difficult to tell whether the return of the tension was due to the adhesion of the iris and capsule or to a return of the cyst. In any case, a cyclodialysis was done. This made matters worse, and the eye gradually became phthisical. I do not feel that electrocoagulation is of great help in these cases, nor do I believe that a cyst like this could be removed by an operative procedure.

Dr. P. Chalmers Jameson, Brooklyn: Dr. Krug's interesting case recalls one that I saw a year ago. About 20 years previously a young boy had both eyes injured by an explosion. I had to enucleate one eye, which was severely wounded, and extract the lens of the other, which had a perforating wound of the iris. Some 20 years later, that is, last year, he developed a large cyst extending from the lower limbus well into the small pupil which I had retained for him. All through these years he had maintained 20/30 vision. I was undecided as to what treatment to pursue.

At a meeting of the New York Ophthalmological Society a case was reported in which a solution of iodine had been injected. The technique was interesting. A few drops of tincture of iodine were removed in a pipet; the fluid from the cyst was withdrawn, allowing it to mix with the tincture of iodine; the mixture thus obtained was injected into the cyst before withdrawing the needle. In this case there was no reaction, and a perfect result was obtained.

There is difficulty in placing a needle into the cyst after it has been withdrawn and the cyst has collapsed. I suggested that we employ two syringes, one to draw off the contents of the cyst and the other to inject the medicament, both needles being introduced before the cyst contents are withdrawn, but I believe that the technique used was better.

My own surgical experience in removing these cysts had not been successful. I have not done many of these extirpations, but the cysts have nearly always recurred. This case did well so far as the destruction of the cyst was concerned, but later developed a condition resembling multiple tubercle nodules. I did everything I could, and yet his pupil is occluded and an active inflammatory condition has continued over the past year.

With regard to the suggestion relative to electrocoagulation, one notes that the two cases just reported developed glaucoma later. While electrocoagulation destroys the cyst itself, is it not just possible that the amount of heat required and generated to destroy the cyst may impair the filtration-angle tissues so that a glaucoma would later develop? That is the consideration which would possibly prevent me from using electrocoagulation in this region, and as surgical treatment is not always successful, we may have to rely upon the injection of chemical solutions to destroy the cyst walls.

A STATISTICAL SURVEY OF 140 CASES OF GONORRHEAL OPHTHALMIA*

WITH DATA OF 68 CASES TREATED WITH NONSPECIFIC PROTEIN (TYPHOID VACCINE)

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From January, 1918, to July, 1937, a period of nearly 20 years, 140 cases of gonorrheal ophthalmia have come under observation and treatment in the Isolation Hospital Division of the San Francisco Department of Public Health. Forty-nine of these cases, or 35 percent, were clinically classified as ophthalmia neonatorum. Only infants 12 days old or younger came under this classification, and all cases in this series were confirmed by numerous bacteriologic examinations. In the 49 cases of ophthalmia neonatorum, with the exception of three, prophylaxis with 2-percent silver nitrate was stated to have been used at birth. Thirty-six cases (26 percent) of the entire series of 140 were in adults, and 104 (74 percent) were in children. Seventy-nine cases (57 percent) were in males and 61 (44 percent) were in females. Of the males, 49 (62 percent) were children; and of the females, 55 (90 percent). For purposes of comparative clinical study of the two methods, the series of 140 cases is divided into time periods of January, 1918, to January, 1927 (51 cases), and from January, 1927, to July, 1937 (89 cases). During the latter period nonspecific-foreign-protein therapy by typhoid vaccine was instituted as an additional treatment. From January, 1918, to January, 1927, 51 cases were observed and treated, of which 20 (39 percent) were of ophthalmia neonatorum. In all of the cases (51), only local treatment was used, with the exception that in four cases milk injections were tried without apparent results, and discontinued. The largest number of cases (11) were treated in 1921, and the smallest number (2), in 1922.

THERAPY

The *local clinical treatment* instituted in the Isolation Hospital for the entire period and to date is as follows:

Prior to 1927, the treatment of gonorrheal ophthalmia was limited to irrigations and antiseptic solutions as advocated by most authorities; namely, boric-acid-solution irrigations administered as often as every 20 minutes, with the irrigation equipment not more than six inches above the eye. Care was used to direct the stream of the solution so that it did not strike the cornea, but was directed towards the inner canthus, in order that the solution might wash out the fornices. The pupil was kept dilated by the instillation of a 1-percent solution of atropine daily. Argyrol in a solution of not over 5 percent and freshly prepared, was instilled every four hours. Mercury cyanide in a 1 to 6,000 solution was used once daily to replace the argyrol instillation. The intervals between irrigations were increased as the pus decreased.

In the first series of 51 cases, the time of entry into the hospital after the disease was recognized varied from three weeks to one day, but the average time was 4.1 days. The disease was bilateral in 29 cases; unilateral in the right eye in 12; and in 10 cases, in the left eye. The results of treatment as measured by the complication of corneal ulcer, which may result in blindness, were as follows:

Seventeen of the 51 patients in the first series developed corneal ulcers, three of

*From the Department of Public Health.

which were present before admission to the hospital. Therefore, corneal ulcers occurred in 14 cases, or in 27 percent, despite the treatment used. It may be of interest to note that in these cases, the average time that the disease was manifest before entry into the hospital was 5.2 days. Moreover, in three of the cases, or in 21 percent of those in which corneal ulcers occurred, the clinical classification was ophthalmia neonatorum.

Vaccine therapy. Of the second series of cases (89 in number), occurring between January, 1927, to July, 1937, 42 were bilateral and 47 were unilateral—21 in the right eye, and 26 in the left eye. Sixty-eight were treated with nonspecific-protein therapy by the intravenous use of typhoid vaccine, with resulting hyperpyrexia. Corneal ulcer, as a complication, occurred in 22 cases of this group. Of these 22 cases, the ulcers were present in 13 instances on admission to the hospital. Therefore, in the 68 patients who received the combined intravenous and local therapy, corneal ulcers occurred in nine, or 13 percent. In the remainder of cases in this series (21), the disease was considered so mild that only local treatment was deemed necessary. The average duration of the disease was 3.6 days before any treatment was instituted.

It is of decided interest to note that all of the 29 patients with ophthalmia neonatorum (33 percent of the series) were treated with the intravenous administration of typhoid vaccine, and none developed corneal ulcers. The routine method of administering the typhoid vaccine was as follows: Ten million organisms of commercial B. typhosus vaccine were injected intravenously to the anterior fontanel. The number of organisms was doubled in amount each day for at least four days or longer, depending on clinical and laboratory findings. In addition, the intramuscular injection of two minims of adrenalin preceding the use of the vaccine was found to be of value. Local treatment, as previously outlined, was, of course, also carried out.

The average number of doses of typhoid vaccine administered to each patient was 4.44, and the largest number of doses to any patient was 24. The least dosage of typhoid vaccine in number of organisms was 5,000,000; and the greatest number, 250,000,000 to one adult—a male, 31 years old. In this particular case, the treatment was continued daily until the patient had received 13 doses of vaccine; and to repeat, the maximum dosage was 250,000,000 organisms. There were no untoward results of the continued vaccine therapy, and the corneal ulcer present on admission to the hospital did not perforate. A concurrent gonorrheal urethritis was not benefited.

Eleven relapses occurred in the series of 68 cases. By relapse is meant a condition in which the inflammation and discharge had cleared enough to discontinue the vaccine but not the irrigations, and which later showed a marked increase of pus and inflammation.

Of the patients in the entire series of 140, nine had one relapse each; one had two relapses, with no ulceration; one had four relapses, with no ulceration. The first of these was a premature infant, who entered the Isolation Hospital Division on February 29, 1936, and had four relapses on the 2d, 3d, 13th, and 30th day following discontinuation of the vaccine therapy.

Case report

Baby B. was a three-day-old illegitimate male infant, born about the seventh month of pregnancy, who had inflammation of the right eye, present for one day. The eye was swollen shut, and on separating the lids, a greenish-yellow pus appeared. The pus contained many gram-

negative, intracellular organisms morphologically resembling the gonococcus. The patient was given one-half hourly boric-acid irrigations; four-hourly instillations of a 5-percent solution of argyrol; and a 1-percent atropine solution was used only once daily. The left eye was sealed with a watch glass.

The child was given an initial dosage of 15,000,000 organisms of typhoid vaccine intravenously. Rectal temperatures were taken hourly, and the temperature rose to 102.4°F. The following day the dosage of typhoid vaccine was increased to 30,000,000 organisms, the rectal temperature rising to 103 degrees. On the third and fourth days, the dosage of vaccine was increased to 60,000,000 with resulting temperatures noted as high as 102 degrees. There was by this time a marked improvement after each treatment, the eye showing slight inflammation and no free pus. On the seventh day, every clinical indication of a relapse, with increased inflammation and pus and specific bacteria, was present. The vaccine therapy was immediately resumed, with the use on the seventh day of 50,000,000 typhoid organisms, increasing to 80,000,000 on the eighth day, to 140,000,000 on the ninth day, and 180,000,000 on the tenth day. Elevation of rectal temperature occurred each day, but never over 100.6 degrees. No rigors were noted.

The eye was apparently clear until the fourteenth day, when pus and inflammation suddenly increased. The vaccine therapy was again resumed with the administration of 75,000,000 typhoid vaccine organisms; 75,000,000 on the fifteenth day; 85,000,000 on the sixteenth day and 85,000,000 on the seventeenth day. There was an elevation of rectal temperature after each injection, recorded as high as 106 degrees, on the seventeenth day.

The eye was again clear and remained so until the thirty-second day, when another relapse occurred. In view of the time between the relapses (15 days), and in view of the high temperature (106 degrees) following the last treatment, the typhoid-vaccine treatment was resumed by administering 15,000,000 organisms. This dosage was increased to 30,000,000 organisms on the thirty-third day; 60,000,000 on the thirty-fourth day; 90,000,000 on the thirty-fifth day, and 100,000,000 on the thirty-sixth day. The rectal temperature was elevated each day, reaching as high as 105.5 degrees on the thirty-sixth day.

The eye was not entirely clear, but it was decided to defer the vaccine therapy for at least one day, because of the last high temperature. The child continued to show no untoward symptoms.

The vaccine therapy was resumed on the thirty-eighth day with 50,000,000 organisms; 75,000,000 on the thirty-ninth day; 95,000,000 on the fortieth day; 125,000,000 on the forty-first day; 125,000,000 on the forty-second day; 150,000,000 on the forty-third day; 180,000,000 on the forty-fourth day, and 200,000,000 on the forty-fifth day. The rectal temperature was elevated after each dosage, reaching as high as 104 degrees on the forty-first day.

The patient gained weight and strength while under treatment, made an uneventful recovery, and was discharged on the sixty-seventh day, after having received repeated negative laboratory examinations.

During the entire illness only the right eye was involved, and it may be interesting to note that the baby's blood was negative for agglutination against B. typhosus.

In the entire series of cases (140), there were 30 male adults, 24 of whom had an acute urethritis. Twenty-seven were male children (12 days to 18 years of age), and in only three was the source of infection ascertained. Of the 22 newborn males,

aged 12 days or less, 17 infections were traced to their mothers. In the six female adults, smears from the cervix showed positive gonococci. The source of the infection was traced in 7 of the 18 female children (12 days to 18 years of age). Three others had vaginal smears positive for gonococci. Of the 27 female newborn, the examination of the mothers of 23 revealed smears positive for gonococci; and in one case, an acute urethritis with demonstrable gonococci was present in the father.

Of the 49 patients classed as newborn, 39 were delivered in a hospital. One was born on shipboard without the assistance of a physician, and another was delivered by a neighbor. One foundling, a premature, who was found on an orphanage doorstep, later died of pneumonia. This was the only death in the series of 140 cases. Six were premature infants requiring incubation.

Discussion

The nonspecific-protein therapy, with typhoid vaccine to produce hyperpyrexia, is begun soon after laboratory and physical examinations of the patient are completed, and almost immediately after admission to the hospital. The dilutions of vaccine desired are made from ampuls acquired from commercial biological concerns. In the newborn and the premature infant, it may be necessary to use the external jugular vein or the longitudinal sinus through the fontanel. Within 15 to 45 minutes after the injection of vaccine, the patient may develop severe rigors, followed by elevation of rectal temperature of 4 to 5 degrees, which temperature may return to normal within six hours. It has been noted that in the newborn, neither rigors nor rise in temperature necessarily occurs, though clinically, the results of the vaccine therapy appear to be just as beneficial. In 24 hours the dose of vaccine is repeated, and if the elevation of temperature does not exceed 104°, the second dose of vaccine is doubled; otherwise, the initial dosage is repeated and the amount of each subsequent dose of vaccine is determined by the same criterion.

Four doses of vaccine on successive days are usually sufficient. Three or four days after the four-day course of the vaccine therapy there may be noted an increase of pus and inflammation. Under these circumstances, it is necessary to repeat the injections of vaccine by giving the same dosage as the patient received at the last treatment. Patients are kept under observation until all evidence of conjunctivitis has disappeared, and three negative smears, 24 hours apart, have been obtained. The change in the physical appearance of the eye, 24 hours after vaccine treatment, is little short of miraculous: whereas upon administration of the vaccine the lids may be swollen, inflamed, and clamped together with thick yellow pus, within 24 hours one may find a diminished amount of pus, the swelling gone, and inflammation subsided. The results of the vaccine therapy as an additional factor of treatment approach the spectacular in the majority of cases.

The percentage (27) of corneal ulcers in the cases in which local treatment was administered, when compared to the percentage (13) in the cases treated additionally with nonspecific-protein therapy as typhoid vaccine, appears to be of more than ordinary statistical importance. The absence of corneal ulcers in the cases classified as ophthalmia neonatorum and treated with typhoid vaccine is likewise significant.

101 Grove Street.

NOTES, CASES, INSTRUMENTS

SILVER ACETATE AS A PROPHYLACTIC FOR OPHTHALMIA NEONATORUM

VICTOR C. RAMBO, M.D.
Germantown, Pennsylvania

When the writer visited Professor Emile de Grósz, at the Royal Hungarian University Eye Hospital in Budapest, he found that Hungary was using 1-percent silver-acetate solution as a prophylactic for ophthalmia neonatorum. The advantage of this salt over silver nitrate is in its safety. A 1-percent solution of either salt is equally effective in preventing gonorrheal ophthalmia. The solubility of silver nitrate is very high, 1 gram being soluble in 0.4 grams of water. The solubility of silver acetate solution is 1 gram to 100 c.c. of water. Because of the low solubility of silver acetate, a stronger solution than is needed for infants' eye can not be made up with water at room temperature. A report on the use of the safer silver-salt solution was made to the Journal of the Christian Medical Association of India in 1931; it has not, however, been reported in America.

On a recent visit to a Midwestern city, the writer heard of three infants who had had a 10-percent silver-nitrate solution dropped into their eyes by mistake. One infant had squeezed out the drops, but the other two had pitiable eyes, with grave damage to the corneas. The physician who had seen these cases had brought the infants into the city for further treatment. The outcome of these cases is not known, but the occurrence does emphasize the danger of using silver nitrate. There seems to be every reason to use the acetate, so safely used in Hungary, as a prophylactic.

In Hungary, the midwives are employed in peasant homes at the time of delivery. They are given a bottle containing a watery solution of silver acetate, with a considerable excess of silver acetate in the bottom. When the solution is used up, more water may be added. The midwife, therefore, has a ready, potent solution on hand, for as long as the silver acetate lasts. It cannot become too strong a solution. Such a procedure is not recommended for America, particularly at a time when the use of silver nitrate is so common. But it shows the safety of the solution of silver acetate, and gives more assurance of having a potent solution for use by persons distantly situated from a source of fresh silver-nitrate crystals.

According to Merck's report for 1906, "Zweifel pointed out years ago the advantages of silver acetate as compared with silver nitrate, for the prophylactic treatment of gonorrhea neonatorum; this view was shared by Scripiades and Bischoff, while Leopold and Dauber held silver nitrate to be the better remedy. J. Thies held that, the two being of equal efficacy, the only possible advantage of one over the other would be due to a greater tendency of one to produce irritation. To settle this matter the author made trials with 2,000 children. After mechanically cleansing the eyes, he placed in the right eye a few drops of a 1-percent solution of silver acetate; in the left eye, a few drops of the usual 2-percent silver-nitrate solution. The eyes were then bathed with a normal saline solution. He found silver acetate to work better than silver nitrate, although the difference was not great.

"Silver acetate has other properties, however, which would appear to make it more suitable to the needs of practice

than the nitrate. While the latter is readily soluble in water, its solutions may gradually become concentrated by evaporation. Silver acetate crystallizes out as soon as a concentration of 1.2:100 is reached. Thus the danger of using too concentrated a solution is entirely precluded in the case of silver acetate. A further advantage of the acetate is said to exist in the fact that, in case silver becomes set free from the solution, the acetic acid thus liberated is less irritant than the nitric acid set free, under similar circumstances, from the nitrate. For prophylactic treatment in midwifery, the acetate would thus appear to be preferable to the nitrate of silver.

"Seefelder (Münchener med. Wochenschrift, 1907, no. 10, p. 475), like Zweifel and Thies, gives silver acetate the preference over silver nitrate in the prophylaxis of gonorrhea neonatorum. In 500 cases in which he used a 1-percent solution of silver acetate, he did not observe an irritant effect.

"After instilling the silver-acetate drops no injury to the corneal epithelium was observed, the cornea remaining always perfectly clear, shining, and transparent. Only in children one to four days of age was a slight inflammation of the conjunctiva observed."

110 Harvey Street.

AN IMPROVED TRANSPARENT EXOPHTHALMOMTER*

W. H. Luedde, M.D., F.A.C.S.
Saint Louis

In demonstrating the first model of a transparent exophthalmometer at the meeting of the Section on Ophthalmology of the American Medical Association, a thin transparent millimeter rule with a zylonite tip fitted for the external orbital notch was used. A metallic straight-edge target finder was also shown that could be moved along the measuring scale to increase the precision of observations by sighting at the exact right angle to the surface of the rule.

By using a transparent substance of appreciable thickness, the perpendicular axis of the direction of observation can be secured more readily if certain guide marks are placed on the surface opposite the marks of the measuring scale. This is accomplished in a new model of the transparent exophthalmometer. Furthermore, as the measuring scale has appreciable thickness it is no longer necessary to attach a zylonite tip to fit the external orbital notch. The end of this thicker ruler has been shaped to fit the notch, leaving no irregular edges. The entire transparent instrument, though not made of glass may be wiped with alcohol for cleansing, but boiling is not desirable. The numbers of the measuring scale are placed at upper and lower margins, so that they may be read with ease when the instrument is reversed for observing right or left eyes, respectively.

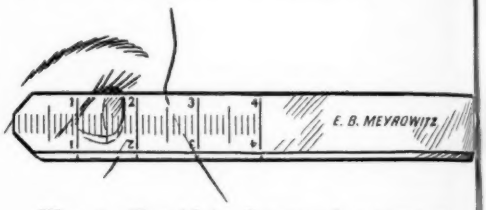

Fig. 1 (Luedde). Improved transparent exophthalmometer.

While the accuracy of notations of the degree of exophthalmos is promoted by these simplifications, it may sometimes be desirable "to record a reading, without change of position, of the lowest part of the bridge of the nose" at the same time that the height of the apex of the corneal profile is noted. The new model was constructed and is being supplied by the E. B. Meyrowitz Company, New York.

1402 South Grand Boulevard.

* From the Department of Ophthalmology, St. Louis University School of Medicine.

SOCIETY PROCEEDINGS

Edited by Dr. H. Rommel Hildreth

MINNESOTA ACADEMY OF OPHTHALMOLOGY AND OTOLARYNGOLOGY

Section on Ophthalmology

April 9, 1937

Dr. W. L. Benedict, *president*

Irritability of Eyes from Anisometropia

Dr. Avery de H. Prangen (Rochester) said a problem which has interested him for a long time is the basic difference clinically between various types of eyes. There is a sharp contrast in the visual capacity and reactions of the emmetropic, myopic, hyperopic, and astigmatic eye. One cannot expect the same performance from all eyes. They differ from one another in their reactions and capacity, as one person varies from another. It is important and useful to keep this in mind when evaluating ocular symptoms and attempting to prescribe for them. The clinical ideal eye is, perhaps, the eye which does not vary too far on either side of emmetropia and with not too much astigmatism; in other words, an eye near the normal in the frequency-distribution curve of refractive errors. These eyes, be they slightly hyperopic or myopic, as a rule carry on their functions very well.

However, the more eyes deviate away from normal toward the higher degrees of ametropia and the more they are accompanied by marked astigmatism, the more difficult becomes their task of carrying on their function. Glasses, as we know, do not make eyes normal; moreover, glasses do not enable eyes with marked errors of refraction to perform with the same ease as do eyes that are nearly normal. It is, therefore, natural to expect that markedly ametropic eyes, though well corrected, should feel much more discomfort and have less capacity for ease of function. The normal eye is an effortless mechanism, and the possessor of such is to be envied. The markedly ametropic eye, on the other hand, has to be whipped and spurred to make it accomplish its tasks. When, in addition, anisometropia and antimetropia, are present, differences in amounts and kinds of error in the two eyes, the difficulty of proper ocular performance becomes even more exaggerated. In these markedly anisometropic and antimetropic eyes there is an essential and intrinsic irritability which even the best of corrections usually fails to subdue completely. People with these eyes often get into a bad state ocularly and mentally through lack of understanding of the true nature of their ocular mechanism. Not obtaining relief, they relentlessly pursue comfort and go from doctor to doctor. Having tried numerous corrections and much varied advice and continuing to be uncomfortable, it is natural for them to assume that there is something radically wrong with their eyes. They come to feel that, eventually, they are faced with ocular disaster.

Now, although this seems a logical conclusion to them, we know that it is not true. It is a false conclusion drawn through misinformation and lack of understanding. It makes a fine basis, however, for a profound ocular neurosis. If the ophthalmologist understands the nature of such eyes and their essential irritability, it is relatively easy for him to put the patient at ease. Eyes like these are a nuisance, not a menace. They are inherited handicaps which require a little

more perseverance and effort to overcome. Even with the best correction possible, they will be none too comfortable, but there is no harm for the eyes in making them work. The fatigue, ocular and nervous, which results from this effort is relatively harmless when understood and philosophically endured. It is the price to be paid for the things which one's ambition wishes to accomplish. The eyes will not in any way be harmed by such usage. Viewed in the light of this reasoning, and when understood by the intelligent patient, the problem of irritable, anisometropic, astigmatic eyes is not difficult. In the writer's experience, the reaction of these distressed people to this explanation is both grateful and satisfactory. Yet they constitute a rather large, troublesome, and difficult group of people in the average practice.

In connection with anisometropia and antimetropia, attention must be called to the work being done on aniseikonia, or size-image difference. This is a most important work and should be watched. It is still in the experimental stage and has not yet been reduced to clinical application for those of us doing office practice. Without doubt, in the near future the studies of this subject will have been thoroughly evaluated and put on a clinical basis.

There is also a definite and basic difference between hyperopic and myopic eyes. The writer formerly thought that "farsighted" and "nearsighted" were misnomers; he believes now, however, that they are well named. There is no doubt that myopic or nearsighted eyes do near work with ease and efficiency, whereas distance vision is more difficult for them. With hyperopic or farsighted eyes, the reverse is true. It is true that both can be made to do all kinds of work, but each excels in its own field. If they are called upon to do the opposite from that for which their aberration adapts them, naturally more difficulty will be encountered.

Discussion. Dr. J. M. Robinson (Duluth) spoke of two means of attacking troublesome anisometropia: first, by the gradual or graduated approach toward the full correction; and, secondly, by giving a fairly full correction to the dominant eye only, while the nondominant eye is allowed for a time to remain only partially corrected.

Pulsating exophthalmos

Dr. H. L. Birge (Fellow in Ophthalmology, the Mayo Foundation, Rochester; by invitation) said that pulsating exophthalmos is a syndrome that has three outstanding characteristics: (1) exophthalmos, (2) pulsation of the eye, and (3) bruit, which is usually heard both by the patient and the examiner. The exophthalmos is usually unilateral. Other signs and symptoms vary in different cases and findings are rarely the same in two cases. The exophthalmos may vary from 3 mm. to 14 mm. or more. It changes from time to time in any given case and may subside spontaneously. It is usually associated with some ocular-muscle weakness and frequently with complete external ophthalmoplegia. The sixth cranial nerve is commonly affected, although the third nerve and sometimes the fourth and fifth may be involved. Diplopia is usually present. Ptosis may occur, or proptosis of the globe may be sufficient to prevent closure of the lid. Visual function may vary from normal vision to amaurosis. Changes in the visual fields may be present and may vary from defects of a single quadrant to central scotoma, depending on the type and situation of the involvement of the nerve.

Pulsating exophthalmos is frequently caused by trauma. Any injury to the head, especially fractures of the base of the skull, may cause injury to the carotid artery as it passes through the cavernous sinus. Pulsating exophthalmos is most frequently attributable to an arteriovenous aneurysm in the cavernous sinus. An aneurysmal dilation of the internal carotid artery in this region, without a venous connection, may cause similar results. A thrombosis of the cavernous sinus may lead to a similar condition. Arteriovenous aneurysm of the ophthalmic vessels in the orbit or just outside may cause the same syndrome. Pulsating exophthalmos may be caused directly by a vascular tumor of the orbit. Besides aneurysms and tumors, the conditions giving rise to pulsating exophthalmos may include abscess of the brain and orbit, Christian's syndrome, severe exophthalmic goiter, or rare complications of heart disease.

Ligation of the common carotid artery may be followed by ligation of the external carotid artery and finally by ligation of the ophthalmic artery after it has been shown by continued digital compression of the common carotid artery that adequate collateral circulation is available.

Eighteen cases of pulsating exophthalmos from the records of the Mayo Clinic were reviewed.

Walter E. Camp,
Secretary.

CHICAGO OPHTHALMOLOGICAL SOCIETY

May 24, 1937

DR. G. HENRY MUNDT, *president*

DERMOID TUMORS OF THE CORNEOSCLERA: SUBCONJUNCTIVAL LIPOMA

DR. ROY O. RISER presented two boys: the first, 14 months of age, showed a yellowish-white lump that had been present since birth, on the right limbus at the 7:00 o'clock position, 1.5 cm. in diameter, half on the cornea and the other half over the sclera. The surface of the mass was studded with typical hair follicles, but no actual hairs were discerned. The cornea over the pupil was not involved. There was an oval lump under the conjunctiva of the right eyeball in the inferior temporal area, 1 × 1.3 cm. in size. The right eye was otherwise normal, as was also the left eye.

The second patient, nine years of age, showed a similar pinkish-white mass, at the 7:00 o'clock position on the limbus of the right eyeball, partly on the cornea and partly on the sclera, measuring 1 cm. in diameter, and definitely elevated. Hair follicles were seen in this case also. There was a thin border of superficial corneal opacity nasal to the elevated mass. Vision, O.D. was 20/100. Under the temporal bulbar conjunctiva of the right eyeball was an oval mass, presenting a yellowish color through the conjunctiva. There was a small 5 × 5 mm. flat white opacity at the 5:00 o'clock position on the left limbus, which showed no definite follicles. No subconjunctival tumors were seen in the left eye. Vision O.S. was 20/20. The condition has been present since birth and is not advancing.

These were dermoid tumors of the corneosclera with accompanying subconjunctival lipomas. Such tumors are misplaced ectodermal tissue and are presumed to be due to amniotic adhesions to the eyeball before the fourth month of development, the eyelids forming at this stage. They are benign, usually stationary in size, but often grow longer and stiffer hair at puberty, which produces irritation. Cases have been reported in which the hair protruded out between the lids and rested on the skin of the lower lid. Such

tumors are to be contrasted with dermoid cysts that are congenital invaginations of ectoderm in which the dermal surface lines the inside of the mass and projects the hair follicles into the lumen of the cyst along with sweat and sebaceous materials. Dermoid tumors may be removed by careful dissection, but a permanent opacity of the underlying cornea cannot be avoided.

Osteitis deformans with pigmented corneal degeneration

Dr. Robert von der Heydt read a paper on this subject which was published in this Journal (November, 1937).

Vision and central fields after glaucoma operations

Dr. E. V. L. Brown read a paper on this subject which was published in this Journal (December, 1937).

Discussion. Dr. Sanford Gifford emphasized the importance of what Dr. Brown had said about the necessity of giving glaucoma patients enough encouragement to lead them to accept surgical interference when it is indicated. The responsibility for the result lies with the surgeon, and if he discourages the patient from accepting an operation it is his fault. In some cases there is loss of vision after successful operations, and Dr. Gifford recalled two cases in which vision dropped rapidly to close to the fixation point. He never hesitated to operate in such cases, and felt that he had never been blamed by his patients, they were told that if they did not have the operation they would lose their remaining vision. Many more tragic results occurred in patients who were discouraged from being operated on, than from poor operations. The common mistake that is still being made is to take a fatalistic view of glaucoma and discourage patients from having an operation in circumstances which warrant it.

Dr. Michael Goldenburg said that glaucoma fields frequently manifest queer and bizarre outlines after operation or, for that matter, without operation. It is now being seriously questioned whether it is the pressure, *per se*, which produces the death of the nerve fibers in these cases. It has been shown in other tissues that it is not so much the pressure as the interference with the nutrition of the individual cells by edema, resulting in anoxia of the individual cell. There is much to be explained in any such type of involvement, depending upon how well the general systemic condition of the patient is maintained. This has a bearing on the final result, and the unfortunate feature at the present time is that the factors in the systemic disturbance that cause these conditions still remain ill defined. Photomicrographs of cell disintegration, the result of anoxia, are extremely interesting and are applicable to this problem. According to Sobanski's recent publication, he feels that the atrophy due to tabes and glaucoma with low tension is the result of a low capillary diastolic pressure, and that in some cases much vision can be saved by attention to this factor. Dr. Goldenburg's own opinion is that when the tension cannot be controlled in the noncongestive type of glaucoma, operation should be performed as soon as possible.

Dr. E. V. L. Brown (closing) said that loss of vision following clouding of the lens by cataract has been excluded in this series so far as possible. Only one or two of the eyes had had complete iridectomy; the others were trephined with root iridectomy. All were cases of simple glaucoma.

Robert von der Heydt

COLLEGE OF PHYSICIANS OF PHILADELPHIA

SECTION ON OPHTHALMOLOGY

April 15, 1937

DR. CHARLES R. HEED, *chairman*

TRIBROMETHANOL (AVERTIN) ANESTHESIA IN EYE SURGERY

DR. EDWARD W. BEACH said that avertin anesthesia in eye surgery reduces the psychic shock, for it may be used in the patient's room and produces a quiet sleep. It relaxes the extraocular muscles and reduces the intraocular tension. The slight fall in blood pressure reduces the bleeding during operation and gives a paler conjunctiva.

When employed as a basal anesthetic much less of the supplementary agent is required. The recovery of consciousness is prolonged, and this period of amnesia is welcomed in these eye cases. Because of the slow recovery, a longer nursing period must be provided, to prevent unconscious movements on the part of the patients. There is little or no postoperative nausea and vomiting.

The greatest difficulty is the determination of the proper dose for complete anesthesia in any given case. To arrive at the amount of the dose, one must consider the physical build, especially the bony structure and age.

Discussion. Dr. Charles W. LeFever said that he had used avertin by preference during the last four years in about 60 cases. What appeals to him especially is the absence of the anesthetist's gauze, saturated with saliva, so close to the field of operation.

He has found that the dosage required is larger than that just stated by Dr. Beach. Smaller doses, 75 to 80 mg. per kilo of body weight, almost without exception required ether to complete the anesthesia. This dosage might be sufficient in senile patients, but for patients under 40 years of age he gradually increased the dosage until at the present time, if a patient is of the muscular type, he gives 95 mg. per kilo, and even then it is often necessary to give a little ether in addition. Once the patient is completely anesthetized the ether may be withdrawn for a very much longer interval than is usual when ether alone is used.

In older people he believes it to be the rule that the blood pressure falls rapidly during the first 20 minutes, while the patient is becoming narcotized. At the end of that time, or perhaps within 30 minutes from the time the avertin is given, the drop in the blood pressure stops; and it starts to rise again, continuing to do so gradually from this time on until it becomes normal. He has seen the blood pressure fall as low as 56/20, at which point it responded promptly to a hypodermic of five minims of epinephrine.

Dr. Luther C. Peter said that he had been using avertin for a number of years and found it one of the best forms of anesthesia for eye surgery. In fact it has few limitations, as Dr. Beach has pointed out. It is not satisfactory for a child under 10 years of age, because of the inability to coöperate. The upper age limits, thus far, have not been fixed. He agreed with Dr. Beach however, that elderly people and those who are obese, should receive the smaller dose of 80 milligrams rather than the upper limit of 90 milligrams.

In the matter of advantages and disadvantages, Dr. Beach has placed the lowering of blood pressure and of intraocular pressure as disadvantages. In cataract and glaucoma, on the contrary, he regarded these as advantages rather than disadvantages. In his experience in the Graduate Hospital there are few cases of

nausea, and most of these, he believed to be due to the necessity for long periods of anesthesia, as in retinal detachment, when supplementary anesthesia must be used. Ether is not a satisfactory supplementary anesthetic. Vinethene and chloroform are the best.

The great advantage of using avertin in elderly people, especially for those who have cataract, is the fact that it eliminates worry. If the anesthetic is administered in their own bed in their room they have no recollection of anything that has transpired. They are not even aware of the fact that they left the room. A second point of great advantage is the quietness of the patient on the operating table, especially in the more difficult cases. In fact, it has made surgery a real joy even when the difficulties are great; for instance, in cases of complicated cataract which follow uveitis with marked posterior synechia. One can make the section without difficulty, release the adhesions with a spatula, and deliver in capsule without any difficulty, providing, of course, a bridle suture is introduced, under the superior rectus, to control the eye.

The other type of case is seen in the patient who has had a sclerocorneal trephining and who also requires cataract extraction. The anterior chamber as a rule is shallow, but with a narrow cataract blade the section can be made with conjunctival flap, the wound can be enlarged by straight scissors, synechiae if present can be released, and the lens can be extracted in capsule. In fact, when the patient is perfectly relaxed and the eye is quiet, one can do almost any type of difficult surgery.

Choroideremia (case report)

Dr. Walter I. Lillie said that the essay on choroideremia by Arthur J. Bedell, awarded the Luciene Howe Prize for Ophthalmoscopic Research given by the Medical Society of New York, presents a thorough review of the literature, new case reports accompanied by fundus photographs, and an excellent description of the different clinical types of choroideremia. Bedell states: "Choroideremia is a peculiar condition characterized by night blindness, sometimes evident in early life but often not conspicuous until the third or fourth decade. It seems to be familial —affecting the males. It is an entity with a pathognomonic fundus, and as it develops during the life of the patient it must not be considered as a congenital absence of choroid but as a dissolution of that membrane. . . . A large portion of the choroid is absent; the macula is intact, and the vessels of the choroid are small and straight and entirely absent. There is no ectasia of the sclera . . . the macular region is the last to register the destructive process."

Dr. Lillie presented the case of a 70-year-old man who was referred by Dr. F. W. Uhler of Easton, Pennsylvania, because of diplopia for the past three months. The patient had always been in good health. For 20 years he had worn bifocal lenses with satisfaction. Four years ago his glasses did not seem comfortable and he consulted an optometrist, who advised an examination at Wills Eye Hospital in Philadelphia. Although the patient states that he was examined and treated, the Wills Hospital has no record of this at the present time.

During the past three years he has been able to work as road supervisor without difficulty, although he is conscious of scintillating scotomata in the form of "heat waves," and when the bright sunlight is reflected from buildings "red vision" results. His present glasses are quite satisfactory, although ocular fatigue ensues after half an hour of reading. One year ago, during a period of three months, he lost 20 pounds, but has been well since October, 1936.

At examination on February 23, 1937,

the vision was 6/10 in the right eye and 6/12 in the left eye with his glasses. The pupils were equal and the reflexes normal. The ocular movements revealed a slight weakness of the left internal rectus, and loss of convergence.

The ophthalmoscopic examination revealed a few small vitreous opacities in each eye. The optic discs were normal in color, the margins were distinct but there was a parapapillary loss of the choroid. The retinal arterioles were slightly attenuated. The choroid was absent in the lower portion of the fundus in each eye, the defect extending into the superior nasal portion in the right eye. The border was distinct and the retinal arteries extended uninterrupted over this area. Pigment clumps were fairly numerous but well scattered. A few choroidal vessels still remained and disappeared abruptly into the normal choroidal margin. The sclera appeared to be normal. The macular region in each eye was intact.

The visual fields revealed a definite bilateral superior altitudinal anopsia. The color vision was normal with the Ishihara charts.

The general examination revealed nothing of importance, and the patient's health is excellent for this age group. There is apparently no similar familial visual disturbance in the past two generations.

This case is of interest for it not only adds to the small group already published, but it apparently presents the oldest onset of the visual disturbance, lacks night blindness, but includes "red vision" from reflected sunlight as a disturbing feature. The diplopia is probably a coincidental central vascular affair.

Partial bilateral colobomata of the optic nerve

Dr. Francis Heed Adler read a paper on this subject which was published in this Journal (August, 1937).

Coloboma of the choroid and partial coloboma of the disc

Dr. Alexander G. Fewell and Dr. Edward S. Gifford reported that J. K., aged eight years, presented, in the right eye, a congenital crescent on the nasal side of the disc, and a hole in the disc on the nasal side. Below the disc was a large coloboma of the choroid, oval at 180 degrees, separated by a narrow strip of normal fundus from another choroidal coloboma beneath which it extended into the periphery as far as could be seen. In the left eye there was a small, round coloboma of the choroid down and out from the disc.

Miss M. K. aged 15 years, a sister, showed a hole in the disc on the temporal side in the left eye.

The fundi of both parents were normal, the mother being hyperopic and the father myopic. Of six living children record of only four could be obtained. The two above presenting anomalies were hyperopic; two others with normal fundi were myopic.

A survey on glaucoma

Dr. Louis Lehrfeld and Dr. Jacob Reber said that analysis of the records at the Wills Hospital over the 10-year period 1926 to 1935, showed 1,876 patients had been diagnosed as glaucomatous. Based on a total hospital admission of 242,533 cases, this represents an incidence of 0.78 percent.

Four hundred and thirteen cases in the group were classified as secondary glaucoma, which is 22 percent of the total series. These cases were studied as to etiology. Trauma was the most important factor, occurring in 101 cases; cataract in 67; iritis in 57; iridocyclitis in 27; choroiditis in 45; keratitis in 30; dislocated lens in 13; intraocular trauma 15; postoperative trauma 27. These various groups were studied as to management and end results. Trauma was present in

39.2 percent; syphilis was a factor in 31.5 percent. Visual mortality in the entire group was 34 percent.

There were 28 cases of congenital glaucoma, an incidence of .01 percent; 20 were in males and eight in females. Vision was uniformly poor. Therapeutic results were discouraging.

There were 20 cases, 12 in females and eight in males, of juvenile glaucoma (five to 40 years of age, excluding buphthalmos). Vision was uniformly below 6/60 when first seen.

Primary glaucoma was found in 415 cases; 392, or 27.7 percent, of the cases were of the congestive type; 1,023 or 72.3 percent, of the noncongestive type; 161 were acute congestive cases. Of the entire series acute congestive cases totaled 11.4 percent; chronic congestive 16.3 percent; chronic simple 72.3 percent.

The greatest incidence, 36.2 percent, occurred in the seventh decade of life in the chronic cases. In the acute cases, 35.4 percent, in the sixth decade of life; 51.5 percent of the cases occurred in females.

No evidence of any Jewish preponderance of glaucoma was found.

In 235 cases there had been previous operative treatment; in 121 medical treatment and in 39 nonmedical (optometrists).

Forty-seven percent of the patients with congestive cases had had symptoms less than six months, whereas 21 percent of the patients with noncongestive cases gave a history of less than six months' duration of symptoms and 27 percent had had symptoms for three years.

A comparative increase in the presence of cataractous changes was found in the glaucomatous patients. Acute congestive cases were also considered from the standpoint of seasonal incidence, it being apparent that the highest incidence occurred during the winter months.

From the standpoint of the degree of glaucoma present when the patients were first seen, it was found that the largest number of congestive cases came to the clinic with late involvement of both eyes. Forty-eight patients had bilateral absolute glaucoma at the time of their first admission. This was also true amongst the noncongestive cases of which there were 70 with bilateral absolute glaucoma. Seven hundred and eighty-four eyes had vision reduced to 6/60 when the patients first presented themselves.

Treatment was considered under two groups; (1) operative and (2) nonoperative or restricted to miotics. Operative procedures were limited to the following: 1. Cyclodialysis. 2. Paracentesis and posterior sclerotomy, considered as temporary alleviative measures. 3. Basal iridectomy. 4. Elliot trephining. 5. Modified Lagrange operation. A small group of cases is also available in which no treatment had been received over a period of years. This group can thus serve, in a sense, as a control.

In all, 900 operative procedures were performed to reduce intraocular tension; 55 cyclodialyses, 18 paracenteses, 45 sclerotomies, 352 basal iridectomies, 378 Elliot trephinings, and 52 Lagranges. Of the entire series 72 enucleations were performed, and 67 cataract extractions in glaucomatous patients.

The results would seem to indicate that the Elliot operation has comparatively the highest efficiency in cases of glaucoma. On the whole, cyclodialysis does not appear to be of great value as a procedure, although it must be remembered that many of the cases in which this operation was utilized were of an advanced and complicated nature. Basal iridectomy, as is generally accepted, is more efficient in the congestive types of glaucoma, particularly when employed early before there are adhesions of the iris root. The Lagrange series is too small to permit of

any conclusions. Continued miotic treatment in chronic simple glaucoma has an efficiency of only 49 percent. This is in agreement with the thought that chronic simple glaucoma is essentially a surgical disease.

A STATISTICAL INVESTIGATION OF LUETIC OPTIC ATROPHY

DR. LOUIS LEHRFELD and DR. ELMER R. GROSS presented a 10-year survey of syphilitic optic atrophy at the Wills Hospital, which included 552 patients with primary optic atrophy and 48 with secondary optic atrophy. Of these 600 patients, 91 were observed and studied sufficiently for conclusive evidence. The remaining cases were tabulated for statistical purposes. The object of this survey is to determine what happened to these patients with syphilitic involvement of the optic nerve from a therapeutic, prognostic, and social-economic standpoint.

The patients were divided into three main groups. Group 1, those who received no treatment for their optic atrophy. The patients in this group were blind or nearly blind on admission to the clinic. Group 2 consisted of those who received antisyphilitic treatment; Group 3, those patients who received a special form of treatment, including fever and subdural therapy.

Seventy-four and nine-tenths percent of the patients in group 1 were blind less than three years, and all were blind at the end of a five-year period. Twenty-three and eight-tenths percent of the patients in Group 2 were blind less than three years, and all were blind at the end of eight years. Twenty-eight percent of the patients in Group 3 were blind less than three years, and all were blind at the end of eight years. This refers to the observed cases from the onset of symptoms to blindness. It appears that primary optic atrophy is a progressive process despite treatment. Our present-day therapeutic armamentarium does not offer a great deal to combat this grave complication of syphilis.

A general statement cannot be made that treatment is contraindicated in primary optic atrophy, although not one case was considered improved in our series. Eight cases remained stationary with routine treatment, and 11 remained stationary with subdural treatment. However, it is likely that these patients may be blind at the end of a 10-year period.

The result of the subdural treatment depends primarily upon the irritant effect of the substances introduced intraspinally. A modification of the Swift-Ellis treatment that is employed in this clinic seemed to induce more meningeal irritation, which produced an aseptic meningitis manifesting itself in signs and symptoms of a meningismus. The patients who have had these reactions seem to hold their own better than those who did not.

The onset of optic atrophy, in most instances, is so insidious that the individual does not realize the seriousness of the situation. When the patient complains of blurring of vision, the optic atrophy is usually already pronounced. The early concomitant signs and symtoms of the associated neurosyphilis are so mild that they frequently escape the physician's attention.

Our present-day treatment of syphilitic primary optic atrophy is unsatisfactory. As in all forms of syphilis, prophylaxis is the best form of treatment. This can be accomplished by education of the public and the physician.

Measures to prevent optic atrophy should include early diagnosis and adequate treatment of early syphilis; secondly, early diagnosis and adequate treatment of neurosyphilis. Pupillary abnormalities are ofttimes the first objective signs of neurosyphilis, and any patient in

whom these are observed should be subjected to a thorough examination, including a spinal-fluid test.

The diagnosis and treatment of optic atrophy requires a close coöperation between syphilologist and ophthalmologist. Visual fields, fundus examination, and visual acuity are of prime importance in diagnosis and in determining the severity of optic atrophy.

Discussion. Dr. Louis Lehrfeld said the reports presented by Dr. Gross and Dr. Reber demonstrate that all research in ophthalmology is not confined to the laboratory.

At Wills Hospital, there are many volumes of records which are waiting for investigators, such as Dr. Gross and Dr. Reber, to delve into their stored-up knowledge and to abstract from them information that may be just as important to the profession as researches made in the laboratory.

Dr. Reber's report states that 22 percent of the glaucoma cases reported at the Wills Hospital in the last 10 years are secondary. Generally, we dismiss the secondary glaucoma cases as playing no part in the consideration of the subject of glaucoma. Our investigations lead us to believe that the causes responsible for secondary glaucoma give us a strong hint as to the pathological physiology incident to primary glaucoma.

Dr. Gross's survey points out the ineffectiveness of our present methods of treating optic atrophy, the result of luetic infection. His report indicates that we must look in other directions for newer methods in collaboration with the syphilographers.

Both of these investigations should give encouragement to the younger men in ophthalmology to carry out research based upon clinical records coupled with examination of patients concerned with these records.

The effect of the testing distance upon the apparent size of a scotoma

Dr. Hazel Wentworth (Ph.D.) said the exact area of the blind spot in 100 different eyes was obtained for a one-degree Hering white and Heidelberg blue, red, and green test object at distances from the eye of 16.6, 33, and 100 centimeters, respectively, and exactly measured in an effort to determine whether the distance from the eye at which a scotoma is mapped has any effect upon its apparent size; that is, upon the visual angle subtended. If so, to what extent; and whether there is any differential color effect.

The work was done on the Holloway-Cowan screen under carefully controlled conditions as to illumination, brightness of background, method of mapping, size of object, amount of practice, and so forth.

With the blind spot obtained at 33 centimeters taken as the standard size for comparison, it was found that the size of the average blind spot increased relatively at the 16.6-centimeter distance and decreased relatively at the 100-centimeter distance. The total decrease in size for the average blind spot between 16.6 and 100 centimeters from the eye was 3.5, 8.22, and 27 percent for form, blue, red, and green, respectively, as compared to a mean error in size for the same number of repeated tests at the same distance (33 cm.) of 2.5, 2.8, 3.3, and 3.4 percent, respectively.

From distribution tables it was found that for red and green, eight to nine out of every 10 cases showed an average decrease in size of nearly one third that taken as standard when the distance increased from 16.6 to 100 centimeters from the eye; for blue, two out of three cases showed an average decrease of one fourth the standard area; and for form, slightly over one half showed an equal amount of change. Only about four fifths as many

cases showed a decrease in size when the distance was increased from 16.6 to 33 centimeters from the eye as when it was changed from 33 to 100 centimeters. The change in apparent size with a change in distance was considered, on theoretical grounds, to be chiefly the result of changes in accommodation. They were shown to be valid from the statistical standpoint. The causal factor for the differential color effect could not be definitely determined.

The significance for practical perimetry was pointed out; that is, that not only does the area of a scotoma obtained at different distances from the eye represent quite different retinal areas when assuming a constant visual angle, but also, since the change is differential for form and color and between the colors, the relative areas of partial and complete loss of sensitivity vary at the different distances. The factor of distance was shown to be of particular importance in the use of a red test object, since this color is one showing the greatest change with distance and is also the most reliable sensitive test of lesions in the optic-nerve fibers and tract that are not observable by objective examination. The importance of the differential effect was shown in that, when attempting to determine the extent to which the nerve fibers have become involved in a retinochoroidal lesion, as indicated by the relation of the limits of the scotomas for red and blue, respectively, the area of the scotoma for red will be judged relatively smaller as compared to that for blue at the greater distance. Plea was therefore made that for comparable results a standard distance be adopted.

This paper, presented in tribute to the late Dr. T. B. Holloway, who suggested the problem and whose support made it possible to carry out the work, will be published in full at a later date.

Discussion. Dr. Francis Heed Adler said that just what causes the change Dr. Wentworth has outlined no one can say. Whether the effect of the patient's accommodating is an important factor could possibly be determined by examining a number of patients under the influence of a cycloplegic.

Dr. Wentworth said that the illumination of the screen was kept constant at seven foot-candles at all distances. The Holloway-Cowan screen was designed to make this possible.

No similar studies have been made of the peripheral field. It is difficult at times, however, to decide whether or not a certain increase in the amount of contraction of a field as the distance increased was definitely tubular.

Changes in the pupil were considered as a part of the general accommodative effect.

A. G. FEWELL,
Clerk.

AMERICAN JOURNAL OF OPHTHALMOLOGY

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PROPHYLAXIS FOR OPHTHALMIA NEONATORUM

The importance of the prevention of ophthalmia neonatorum, due to the gonococcus, has been almost universally recognized by the medical profession, and very widely provided for in laws and regulations of health departments. Almost as generally has it been prescribed that such prevention was to be effected by instillation of silver-nitrate solution at the time of birth, the Credé method. Dr. Joseph Price, the Philadelphia surgeon, when he was physician to the Preston Retreat, lying-in hospital, did not adopt the Credé method but relied on thorough sterilization of the birth canal. This was a practical measure where women were required to be in the hospital some days before the confinement, and the results secured by Price were equal to those obtained by careful application of the Credé method.

Conjunctivitis in the newborn is caused by other organisms than the gonococcus. Any ophthalmologist of large experience has encountered such cases. On the other hand, silver nitrate is a severe irritant to the conjunctiva and cornea, and cases have occurred in which it caused serious conjuctivitis in the eyes of infants, when no gonococcal infection was present. Its use in the treatment of conjunctivitis at too short intervals, more than one application in 24 hours, has also caused severe, permanent opacities of the cornea. In the widespread us of Credé's prophylactic the directions he gave, of a single drop of a 2-percent solution, have often been disregarded by nurses and practitioners. It is, therefore, a real service to have brought to our attention the use of a solution of

silver acetate as a prophylactic, which has been done in the paper upon the subject on another page of this issue.

Professor Emile de Grósz, of Budapest, is well known to the ophthalmologists of this country, since he was the guest of the American Academy of Ophthalmology and Oto-Laryngology in 1930 and has for many years contributed important and well-balanced articles to the literature of ophthalmology. The introduction of silver acetate, as a safer and more widely efficient prophylactic, should be welcomed. Its general application must often be in the hands of nurses or registered midwives; and in sparsely settled districts where new drugs cannot be obtained without fatal delay.

In some of the larger cities of the country silver acetate can be obtained only by sending to the wholesale drug manufacturers. In the laws of many of our states silver nitrate is mentioned as the drug to be used. This might be considered an instance of the dangers and difficulties of "State Medicine." It will be of interest to the profession to have readers who make trial of the new prophylactic report their experience in early numbers of our medical journals. It is a matter that concerns not only ophthalmologists but still more closely obstetricians, general practitioners, nurses, and midwives who are liable to penalties for neglect of safe and necessary measures.

Edward Jackson

BELGIUM ARGUES SPECIAL LICENSURE

A number of European countries have, in one form or other, legal requirements for separate licensure of those who are definitely qualified for practice of the medical specialties. For a decade or so Belgium has been deliberating concerning a proposal to issue supplemental diplomas to medical specialists. The subject was commented upon editorially in this Journal seven years ago, with incidental reference to the Belgian situation (1930, v. 13, p. 1009). A report on the subject appears in a recent issue of the Bulletin of the Royal Academy of Medicine of Belgium (1937, sixth series, v. 2, October 30, p. 470).

A good deal of strenuous opposition to the Belgian scheme has come, as might be expected, from the general physicians, who feel that they may be deprived of privileges previously assured to them by their license to practice "medicine, surgery, and obstetrics." The fear is in some degree reasonable, but is apparently based upon misunderstanding.

A recent communication to the Belgian Academy, from the Ministry of Public Health, requested a formal reply by the Academy to the protests which had come from medical groups, the medical press, and the daily press. The Academy therefore adopted a reply which states very concisely and effectively some of the arguments in favor of special licensure and adequately refutes the objections of Belgian opponents.

Some of the critics appear to feel that the chief purpose of such legislation is to protect the fully qualified specialist against competition by those less substantially prepared, as well as to protect the public against inadequate specialization. They urge the more serious objection that the practitioner who is not furnished with a special diploma might, in relation to a procedure which exceeded the usual bounds of general medical practice, be accused of having transgressed the limits of his competence and might be rendered liable medicolegally for any possible harm sustained by the patient.

The Belgian Academy points out, however, that the proposed legislative enactment specifically safeguards general prac-

titioners in their previously existing right to practice any medical act whatever, the patient's recourse for damages being restricted to cases of ignorance, negligence, or serious error.

The Academy urges that the purpose of the creation of the special diploma is to enlighten the public mind. If the layman, thus provided legally with an opportunity for discrimination between different groups of practitioners, places himself in the hands of a nonspecialist for care of a condition requiring special qualifications, he will (under the proposed new law) do so on his own responsibility, and will have deprived himself of legal recourse against the physician whom he has selected.

Under the proposed Belgian law the special diploma would be granted only after several years of practice. It would offer no other legal prerogative than the right to use the title. No physician would be allowed to call himself "specialist" who did not possess the required special diploma.

The Belgian Academy further expresses itself in favor of a requirement that, as far as possible, only possessors of the new diploma should be placed in charge of special services in those health organizations whose inmates or patients do not enjoy free choice of physician.

Under democratic government it seems hardly probable that the private patient will ever lose the privilege of choosing, however ignorantly, his own physician. But information available to the public as to special medical qualifications of those who are consulted should not be limited to the claims made by the physician or his supporters. The conditions under which the title of "specialist" was first assumed in the United States led to the term being held in scorn and derision among respectable physicians and enlightened laymen. The expression is, however, a useful one and is held in respect in a number of European countries. It seems likely that possession of an authentic special diploma or license as a legal stamp of approval for special qualification will ultimately be required and accepted in every civilized community.

W. H. Crisp

OCULAR TUBERCULOSIS

In this issue appears a very thoughtful article on tuberculosis of the eye by a recognized authority. The paper was read before the Inter-State Postgraduate Medical Association of North America which met in Saint Louis in October, 1937, under the Schneider Eye Research Foundation. This foundation, originated about 10 years ago in memory of Dr. Schneider of Milwaukee, was an endowment of the Inter-State Postgraduate Medical Association for the purpose of inviting a speaker to present a paper on some ophthalmological subject each year before the Society. This is the only ophthalmological paper on the program, hence must be written to interest nonspecialists, who make up the audience. Tuberculosis in any form does this, and hence proves a particularly appropriate subject for such a lecture. Furthermore, this year the speaker gave a talk of very general interest because it has an application to tuberculosis wherever located in the body.

Every ophthalmologist is confronted with the problem of ocular tuberculosis, its diagnosis, and treatment. In this article is well summarized much of the existing knowledge on the subject in a clear, concise manner. It requires thoughtful reading but will well repay the time so spent. In fact a second reading for careful digestion will prove valuable.

Among the important features is the division clinically into two groups, "a classical nodular iritis, with hard miliary tubercles over the surface of the iris" and

"an entirely noncharacteristic exudative or serous iritis." The latter tends to clear and then recur. Such a classification falls into the experience of all ophthalmologists. The former group, fortunately rare, almost invariably progress unfavorably, and the latter group relatively well. In discussion of the various ocular manifestations the author suggests that the solitary patches of choroiditis so frequently seen may be judged tuberculous if other causes can be excluded. Regarding the location of the primary source, evidence seems to point to peribronchial lymph nodes as the most frequent, and X-rays may be moderately helpful in determining this.

The relation of the intensity of skin reaction to tuberculosis has little or no bearing on the diagnosis unless strongly positive. Diagnosis must be made from the appearance of the eye and by exclusion of other causes. This opinion is in line with that of most physicians who have used skin tests extensively.

Two concepts of the action of tuberculin exist, the older in which allergy was thought to be responsible for immunity, and the newer according to which tuberculin was used "to remove tissue hypersensitivity, to achieve and maintain tissue desensitization, and to allow the little-understood forces of immunity free play in the final healing and encapsulation of the lesion." From careful observation over many years at the Wilmer Institute the latter method of treatment by desensitization has proved the better. Therefore prolonged treatment over several years with doses so small as not to produce an obvious reaction is advocated. Lower doses are used when the eye is inflamed and hypersensitive, and higher doses when the eye is quiet. Some of the patients are desensitized so that no reaction is produced to as much as 500 mg. of old tuberculin. The older idea or "perifocal concept" involved the production of repeated allergic reactions in the tissue until the eye became quiet, at which time treatment was stopped. A word of caution is given against the use of tuberculin by any method in cases of hypersensitivity.

For the past four years this subject of ocular tuberculosis has been studied carefully in a special division of the ophthalmological clinic at Washington University. Many of the findings are confused and contradictory, hence it has not been possible to arrive at many definite conclusions, but a few facts pertinent to this paper stand out clearly and one of these is that there are a certain number of patients with uveal and corneal tuberculosis who unquestionably improve or at least remain unchanged while under tuberculin treatment and who become definitely worse when this treatment is discontinued. These are patients who have taken small doses over a long time.

One point should be stressed, that in a certain number of cases of the indefinite type of tubercular ocular lesion tuberculin will do good. Other factors, such as general health care, are essential and just as important as in pulmonary or bone tuberculosis, but the prolonged treatment with low doses of tuberculin may well be employed to supplement them.

Lawrence T. Post

BOOK NOTICES

FLYING VISTAS. By Isaac H. Jones, M.D. Cloth bound, 12 mo. Illustrated, 255 pages. Philadelphia, J. B. Lippincott Co., 1937.

The beginnings of aviation will be of interest to all future generations. There are official records, magazine articles, newspaper clippings of crashes and missing men; but, perhaps, the most broadly interesting account of it will be this tribute of a Chevalier of the Legion of

Honor to his comrade. This book is dedicated to General Theodore Charles Lyster, who first entered a new field of practical research in creating aviation medicine. General Lyster received the Distinguished Service Medal largely for creating the Flight Surgeon. When the aviation service became of supreme importance to the combatants in the World War, General Lyster directed the education of the medical profession to choose, among the host of applicants, those best fitted for flying; and Isaac H. Jones travelled over the country instructing otolaryngologists in the Bárány tests of equilibrium, to fit for "blind flying."

This book is well named, for it gives brief glimpses of this swiftly growing department of human knowledge. The chapter headings are: Flying and the pilot himself; The aviation examinations; The eye; The ear, a dual sense-organ; Blind flying; General medical examinations; The air commutor (suggestions for passengers). Under the heading, Aviation medicine, the background, five chapters are devoted more directly to history. The incidents of which it tells are well illustrated by Dr. Jones's first meeting with General Gorgas: "It was in his hotel bedroom that I met 'Doctor' Gorgas for the first time. Dr. Lyster and I had just finished writing the A.G.O. 609 (Instructions for standard tests of the aviation examinations). Dr. Gorgas said 'Theo, I need you with me in Washington.' He then turned to me and said: 'Lieutenant, you will take over the work of recruiting for aviation.' " It must be remembered that General Lyster had served with Surgeon-General Gorgas in Panama, and was already entitled to honorable retirement in the Army Medical Corps.

This book should be known to the ophthalmologists and otologists of our day.

Edward Jackson

METHODIK DES OPTISCHEN RAUMSINNES UND DER AUGENBEWEGUNGEN (Methods of study of the optic sense of space and of ocular movements). By Armin Tschermak-Seysenegg, Prague. Being part 6, no. 10 (conclusion) of section 5 of Handbuch der biologischen Arbeitsmethoden, edited by Dr. Emil Abderhalden. 355 pages, together with table of contents for this volume and some other parts of section 5 of the series. With 88 reproductions in the text. Paper covers. Berlin and Vienna, Urban & Schwarzenberg. Price RM 20.00.

This efficient but extremely technical monograph is destined for use by the research worker rather than by the average ophthalmologist. It lays particular stress upon the necessity for clear distinction between objective external space and the subjective sensation and idea of space; between motility and sensitivity; between ocular movements and perspective. Chapter after chapter is devoted to the most detailed consideration of technique and its instrumentarium, from complete fixation of the subject's head and of the direction of gaze, through testing of sensory and motor orientation in space and special methods of testing binocular vision, down to a study of stereoscopy and the technique of examination and analysis of monocular and binocular movements.

A satisfactory subject index is appended. Many references to the literature of the subject are given, chiefly as footnotes. The very numerous and well-printed illustrations are partly taken from other authors and partly original with Tschermak-Seysenegg.

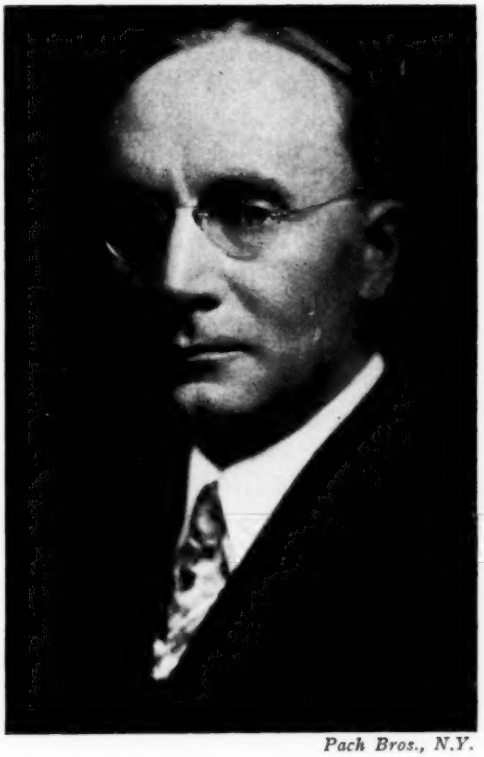
W. H. Crisp

OBITUARY

JAMES HENRY ANDREW

Dr. James Henry Andrew was born at Cambridge, New York, on July 29, 1874, and died at the Brooklyn Hospital on November 26, 1937, after a short illness. He graduated from the Polytechnic Preparatory School in Brooklyn and received his M.D. at Bellevue Medical College, New York, in 1896. After nine years of general practice he limited his work to ophthalmology, having served for four years at the New York Eye and Ear Infirmary under Dr. Marple. In 1908 he was appointed Assistant Surgeon, and later Associate Surgeon, on Dr. Jameson's Clinic at the Brooklyn Eye and Ear Hospital. In 1925 he became Attending Surgeon, a position occupied by him with honor until his death.

Dr. Andrew brought to his work the highest traditions of the medical profession. He was thoroughly trained for his specialized field of service, unusually gifted in the skills and techniques of the ophthalmologist, and conscientiously devoted to the welfare of his many patients. In every way he proved himself worthy of the respect and admiration which his medical colleagues and the general public bestowed upon him. The eminence which he achieved and the renown which came to him were altogether deserved and he will ever live in the grateful remembrance of those who have been touched by his ministry of helpfulness.



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James Henry Andrew, M.D.

While his associates delight to recall his professional abilities and his useful service to society, he is remembered especially for the personal friendship which they enjoyed with him through the years. Genial in manner, affable in conversation, a loyal comrade and a true friend, he brought to his colleagues the inspiration of a radiant and wholesome personality whose presence is still felt and whose influence will continue in the years to come.

Mortimer A. Lasky

ABSTRACT DEPARTMENT

EDITED BY DR. WILLIAM H. CRISP

Abstracts are classified under the divisions listed below, which broadly correspond to those formerly used in the Ophthalmic Year Book. It must be remembered that any given paper may belong to several divisions of ophthalmology, although here it is only mentioned in one. Not all of the headings will necessarily be found in any one issue of the Journal.

CLASSIFICATION

1. General methods of diagnosis
2. Therapeutics and operations
3. Physiologic optics, refraction, and color vision
4. Ocular movements
5. Conjunctiva
6. Cornea and sclera
7. Uveal tract, sympathetic disease, and aqueous humor
8. Glaucoma and ocular tension
9. Crystalline lens
10. Retina and vitreous
11. Optic nerve and toxic amblyopias
12. Visual tracts and centers
13. Eyeball and orbit
14. Eyelids and lacrimal apparatus
15. Tumors
16. Injuries
17. Systemic diseases and parasites
18. Hygiene, sociology, education, and history
19. Anatomy, embryology, and comparative ophthalmology

1

GENERAL METHODS OF DIAGNOSIS

Abdulaev, G. G. **A design for a slit-lamp.** Viestnik Opht., 1937, v. 11, pt. 2, p. 211.

To the construction of the author's slitlamp as previously described (Sovietskii Viestnik Opht., 1936, v. 8, p. 707), this article adds illustrations.

Ray K. Daily.

Berens, Conrad. **A chart for testing the visual acuity of amblyopic children and adults.** Brit. Jour. Ophth., 1937, v. 21, Dec., pp. 661-662.

The chart described and illustrated is especially helpful in testing children of three years of age and younger. The article is in the nature of brief description. (Illustrations.)

D. F. Harbridge.

Berens, Conrad. **Stereoscopic cards in color for children: series B.** Brit. Jour. Ophth., 1937, v. 21, Dec., pp. 659-660.

These cards are considered useful in estimating the degree of vertical and lateral heterophoria, and extensive degrees of aniseikonia, and in determining the presence or absence of first, second, and third grades of binocular vision. Other values are also briefly outlined. (Illustrations.)

D. F. Harbridge.

Chapman, G. H., Lieb, C. W., Berens, C., and Curcio, L. **The isolation of probable pathogenic staphylococci.** Jour. of Bacteriology, 1937, v. 33, May, p. 533.

A useful method of differentiating pathogenic staphylococci in cases where rabbit inoculation tests are impractical is growth on 0.017 percent bromthymol-blue lactose agar pH 8.6.

Edna M. Reynolds.

Cooper, F. M. **The importance of fields of vision.** Jour. Oklahoma State Med. Assoc., 1937, v. 30, April, pp. 115-119.

A review of the field changes found in the commoner ocular and intracranial disorders.

Ralph W. Danielson.

Dashevsky, A. I. **Localization of changes in the eyeground and peilinga-**

tion of their projections on the sclerotic. Arch. of Ophth., 1937, v. 18, Oct., pp. 586-603.

This study consists of two parts; the first treats of the precise localization of the intraocular lesion with reference to definite points of the eye, the second part considers the best method of topographic localization on the sclerotic of the point where it is necessary to make an incision or cauterization when operating. The immediate finding of these points on the sclerotic is called peilingation. The author presents a new method of localization and reports a case illustrating the use of his method. Both coördinates of the projection of the focus on the sclera are denoted in degrees. The distance in degrees from the anterior pole of the eye is determined by means of ophthalmoscopic perimetry. A special graduated peilingator which consists of a thin metallic ring, 3 mm. wide, with a 14-mm. opening, is placed on the eyeball concentric to the cornea. On this ring is a small metallic rod attached in such a way that its axis appears as a prolongation of the radius of the eyeball and forms an angle of 45 degrees to the optic axis. In the upper part of this rod is a notch into which is fitted a freely moving, thin, small metallic arc, which may be shifted so that its pointed end will indicate the exact point corresponding to the projection of the focus on the sclera. (Bibliography.)

J. Hewitt Judd.

Fonviller, P. **Vital microscopy with the ultropak system.** Viestnik Opht., 1937, v. 11, pt. 1, p. 62.

A brief indication of the possibilities offered by vital staining and microscopy of living tissues.

Ray K. Daily.

Fortin, E. P. **A small model of entoptoscope.** Arch. de Oft. de Buenos Aires, 1937, v. 12, July, p. 456.

This entoptoscope for clinical use utilizes a small Phillips mercury lamp and a yellowish Zeiss polarizer and Uviol filter. The entoptoscope tube is 10 cm. long and 4 cm. in diameter. It is fastened solidly to a stand, and is provided with six oculars for the various entoptoscopic observations already described.

M. Davidson.

Frandsen, H., and Larsen, T. **Charts for determining the light sense based on the photometric cell.** Det oftalmologiske Selskab i Köbenhavn's Forhandlinger, 1936-1937, pp. 10-13. In Hospitalstidende, 1938, Dec. 21.

These charts were demonstrated before the meeting, and seem the result of painstaking research, but the article is not suitable for abstracting.

D. L. Tilderquist.

Goldfeder, A. E. **Malaria and the eye.** Viestnik Opht., 1937, v. 11, pt. 2, p. 182.

On the basis of his clinical experience and a review of the literature the author concludes that the nervous system is easily attacked by the malarial toxin and is the selective site of malarial infection. The embryologic and physiologic properties of the eye predispose it to malarial complications, and it may be involved in all forms of the disease, with protean manifestations. "Malarial vessels" of the conjunctiva are characterized by their superficial situation, dark hue, tortuosity with the eye directed forward, and absence of branching or anastomosis. Bilateral anesthesia or hypoesthesia of the cornea is most suspicious of malaria. "Malarial retinosis" is the term given by the author to a greenish-gray or bluish-gray tint of the peripapillary or macular region.

In the author's opinion this symptom is as pathognomonic of malaria as Hutchinson's teeth are of syphilis.

Ray K. Daily.

Grosz, Stefan. **Cutis reaction for lues in ophthalmology.** Zeit. f. Augenh., 1937, v. 93, Nov., p. 186.

Grosz uses a saline-solution tissue extract of a syphiloma from rabbits inoculated intrascrotally with several trains of spirochete. It is distributed in ampoules, is named luotest, and is used for intradermal injection. A positive reaction consists of an urticarial plaque 2 by 4 cm. that has not passed the height of its development in 48 hours. The test is valuable in congenital and late lues. Although it does not replace the Wassermann reaction, it is particularly useful in parenchymatous keratitis, where it is the more sensitive test. It is of great value in differential diagnosis, particularly because severe acquired keratitis is becoming rare, and mild and atypical cases in the offspring of inadequately treated parents are becoming more common. The test is also of value in episcleritis, kerato-iritis, uveitis, and periostitis as an expression of late latent syphilis where serologic tests are of no avail.

In metalues the luetin test cannot be used, and it is negative in the early stage. A provocative action, noted on second or third injection, occurs, and a negative Wassermann reaction in the tertiary stage may become positive after luetin. In this respect, luetin is more reliable than salvarsan. The test has also been used therapeutically, based on allergy.

F. Herbert Haessler.

Haessler, F. H. **Near reaction of the pupil in the dark.** Arch. of Ophth., 1937, v. 18, Nov., pp. 796-801; also Trans. Sec. on Ophth., Amer. Med. Assoc., 1937, 88th mtg.

Measurements were obtained by means of instantaneous photographs of the pupils of eyes that were in a known state of convergence in the dark. These describe the pupillary reaction associated with near vision in the absence of other stimuli. The subject fixed a radiolite object moved along a horizontal bar so as to produce between the visual axes an angle of 6, 12, 18, and 24 degrees respectively. Comparative measurements are presented in a table. Inspection of the data makes it clear that the decrease in pupillary diameter was proportional to the increase in angle of convergence in 27 of the forty experiments. The other thirteen showed no uniform tendency. (Discussion.) J. Hewitt Judd.

Haitz, Ernst. **Central scotoma in congenital and squint amblyopia.** Klin. M. f. Augenh., 1937, v. 99, Dec., p. 761.

Haitz reviews the findings of Heine and Uhthoff in amblyopia associated with central scotoma. He points out that workers who have used his very sensitive stereoscopic method have found much smaller scotomata.

F. Herbert Haessler.

Hildreth, H. R. **A mercury-arc red-free ophthalmoscope.** Amer. Jour. Ophth., 1938, v. 21, Jan., pp. 61-63.

Ibanez Puiggari, M., Oribe, M., and Malenchini, M. **Orbital tomography.** Arch. de Oft. de Buenos Aires, 1937, v. 12, July, p. 464.

The problems in radiography of the orbit arising from superposition of cranial bones has been found vastly simplified by tomography ("a selective procedure which allows study of the body in separate planes, indicating its

anatomic structure and relations"). Complete series, frontal and sagittal, of the whole orbit are advocated in order to do justice to the method. Tomography gives more precise information than it is otherwise possible to secure in regard to circumscribed lesions of the orbital wall, intraocular and intraorbital foreign bodies, the optic foramina, and the orbital apex, as well as paraorbital sinuses and the sella. (Illustrated.)

M. Davidson.

Icaza y Dublan, M. J. **Symptomatology of pupillary reflexes.** Anales de la Soc. Mexicana de Oft., 1937, v. 12, July-Sept., pp. 49-60.

A routine statement of the subject.

Keil, J. **A new ophthalmodynamometer.** Klin. M. f. Augenh., 1937, v. 99, Nov., p. 625.

In this new compression-ophthalmodynamometer, pressure from a weighted pendulum which is displaced from its vertical position of rest on the path of a calibrated arc is transmitted by a lever to the sclera. A brake is provided so that the instrument may be used without any assistance.

F. Herbert Haessler.

Kogan, E. C., and Akimochkin, F. I. **Examination of depth perception with Davidson's device.** Viestnik Opht., 1937, v. 11, pt. 2, p. 241.

After using the Davidson device for two years the author concludes that its findings are reliable, and that it has the advantages of simplicity, cheapness, and portability. He urges its extensive use in examination of flyers.

Ray K. Daily.

Kühn, Werner. **Measurements in the ocular fundus.** Graefe's Arch., 1937, v. 138, pts. 1 and 2, p. 129.

Using the method of Erich Lobeck or the employment of a special ocular added by Zeiss to the simplified Gullstrand ophthalmoscope, it is possible to accurately compare the size of anything in the fundus to the fairly uniform known width of the optic papilla. This ocular, making use of the heliometer principle employed in astronomy, contains a lens whose thickness in the superior half of the lens is split into two halves. The latter can be moved independently of each other by means of a micrometer screw and the amount of the movement can be accurately read in divisions marked upon the micrometer screw. For measurements near the center of the fundus, a dilated pupil is not necessary. Using this method, 397 eyes in 225 healthy individuals of different age were examined at the University Eye Clinic at Jena as to the width of the retinal artery and vein at the margin of the papilla. It was found that the relation of the width of the retinal artery to that of the vein and the papilla with a value of 1 for the width of the artery gave on an average the proportion of 1:1.2:14 to 16. The relation of the width of the artery to that of the vein was as a rule 5:6.

H. D. Lamb.

Lijo Pavia, J. **Ophthalmoscopy and indirect illumination.** Rev. Oto-Neuro-Oft., 1937, v. 12, Sept., p. 233.

The author employs with advantage the Vogt method of indirect lateral illumination in ophthalmoscopy, but prefers the term retrograde chorioretinal transillumination. Lesions appear as if seen by infrared ophthalmoscopy.

M. Davidson.

McLean, A. J. **Practical perimetry: construction and operation of the tangent screen.** Canadian Med. Assoc. Jour., 1937, v. 36, June, p. 578.

Detailed instructions for the construction of a practical and inexpensive tangent screen are given and careful directions for its use are outlined. Charts of fields found in hysteria, toxic amblyopia, brain tumors, and so on are given. The fact that perimetry is a necessary diagnostic method in ophthalmology and neurology is emphasized. Edna M. Reynolds.

Magitot, A., and Dubois-Poulsen. **Condemnation of colored test objects** in clinical perimetry. Ann. d'Ocul., 1937, v. 174, Oct., pp. 649-665.

The use of colored test objects in perimetric studies is subject to numerous errors, most of which are not remediable. In all cases in which a scotoma for color is found a corresponding scotoma for white can be demonstrated by using test objects of suitable size. For routine testing a gray arc-perimeter of 33 cm. is desirable. A larger test object should be used in the periphery of the field than near the fixation point. An object 1 to 1.5 mm. in diameter is recommended for the zone between 10 and 30 degrees and an object of 3 mm. is desirable for the zone between 30 and 90 degrees. The use of white test objects is more reliable and easier than the use of colored objects. John C. Long.

Paul, Ludwig. **The ophthalmoscopy of localization. 5. Observations on the form and size of the eye and on the origin of anomalies of refraction by the use of percentage calculation.** Graefe's Arch., 1937, v. 138, pts. 1 and 2, p. 55.

In a previous article, eyes to be measured were conceived to vary in size from a schematic eye of the same shape. From the absolute length in millimeters for the radius of the cornea, its value in percentage was computed as compared with the length of the radius of the cornea in the schematic eye of the same shape. The same calculation was made for the length of the sagittal axis of the eye, for the amount of ametropia or refraction of the eye in diopters, and for the refraction of the lens to obtain the percentage value for each factor as compared with a schematic eye of the same shape. The figures were tabulated for these factors in 229 eyes varying in refraction between +7.00 D. and —10.00 D. It was found that the length of the radius of the cornea as a rule increased with greater length of the axis of the eye, but diminished little in size with additional myopia, even in adults. The percentage variation of the axis length of the observed eye as compared to that of the schematic eye depended exclusively upon the varying strength of refraction of the lens, conditional upon the position, form, or refractive index of the lens. This percentage value of the axis length of the eye was designated the lens value. The lens value increased somewhat with additional myopia; that is, with greater myopia the relative refractive power of the lens diminished slightly. In that way, the increase in the refractive power of the cornea occurring with additional myopia could as a rule be equalized. The refractive power of the entire optical system generally remained about equally large in all anomalies of refraction. The axis length of the eye increased with additional size of the eyeball but principally with greater myopia. The near-sightedness of an eye was dependent much more upon a greater axis length of the eye than upon an increased refractive power of the optical system. H. D. Lamb.

Peyret, J. A. **Pupillometry and pharmacodynamic reactions.** Arch. de Oft. de Buenos Aires, 1937, v. 12, Sept., p. 549.

The author has checked and modified the Sciortino method of studying the pupillary reactions by means of very weak standard solutions of mydriatics and miotics, in order to differentiate between lesions of the dilator and those of the constrictor, and to learn the side affected in cases of anisocoria. He employs a pupillometer consisting of two parallel metal threads, one fixed and the other mobile, attached to the ends of two U-shaped prongs, one sliding on the other and controlled by a screw, and provided with a handle to keep the pupillometer steady against the supra-orbital region. The examination of 41 normal individuals, dark adapted, uniformly illuminated, and accommodating for eight meters, confirms approximately the findings of Sciortino, namely that a 0.25 percent solution of cocaine will produce minimal mydriasis of 0.25 mm. and maximal mydriasis of 1.5 mm.; that 1 to 3500 pilocarpine-nitrate solution produces minimal miosis of 0.5 mm. and maximal miosis of 1.75 mm.; and that eserine sulphate 1 to 6000 solution produces minimal miosis of 1.25 mm. and maximal miosis of 2.25 mm. The minimal reactions are in fifteen minutes, and the maximal in one hour.

M. Davidson.

Rabinovich, M. G. **A projection device for determination of visual acuity.** Viestnik Opht., 1937, v. 10, pt. 6, p. 856.

A new device for projecting test objects or letters on a screen. (Illustrations.) Ray K. Daily.

Rabkin, E. B. **Examination of color vision.** Viestnik Opht., 1937, v. 10, pt. 6, p. 787.

A comparative evaluation of the author's polychromatic color plates and Ishihara's tables. The conclusion that the author's polychromatic color plates afford a finer differential diagnosis than Ishihara's tables is based on examination of 349 dichromates and anomalous trichromates, with the author's plates, Ishihara's tables, and the Nagel anomaloscope. Ray K. Daily.

Rohrschneider, W. **The specific diagnosis of ocular tuberculosis.** Klin. M. f. Augenh., 1937, v. 99, Nov., p. 682.

In order to demonstrate the specifically tuberculous nature of an ocular lesion it is necessary to produce a focal reaction by subcutaneous injection of tuberculin. Great difficulty is encountered in evaluation of the focal lesion. To aid in this, Samojloff and Mexina suggested repeated measurement of intraocular tension before and after injection of tuberculin. Rohrschneider repeated these experiments and concludes that the method has only limited use. Occurrence of spontaneous variations in pressure makes it difficult to be sure that a rise in tension is ascribable to the tuberculin. The author also found that in some eyes with other definite evidence of a focal reaction to tuberculin the tension did not rise.

F. Herbert Haessler.

Spector, S. A. **A new perimeter with two test objects, and its advantages.** Viestnik Opht., 1937, v. 10, pt. 6, p. 861.

The author's perimeter has two test objects moving simultaneously, in the temporal and in the nasal fields. Its chief advantage is the greater ease of demonstrating relative scotoma, especially for colors. (Illustration.)

Ray K. Daily.

Weinstein, Paul. **Associated symptoms in ophthalmology.** Ann. d'Ocul., 1937, v. 174, Oct., pp. 679-684.

Two entirely independent disease

conditions may occur simultaneously, confusing the clinical picture. To illustrate this the author reports cases demonstrating combinations of the following: tabes and tobacco-alcohol neuritis, tabes and syringomyelia, simple glaucoma and suprasellar calcification, embolus of the cuneus and sellar calcification, thrombosis of the central retinal vein and choroidal sarcoma, chronic inflammatory glaucoma, and cerebral arteriosclerosis. The close interdependence of oculist and internist is stressed. John C. Long.

2

THERAPEUTICS AND OPERATIONS

Bogoroditzki, H. I. **Sodium chloride 0.5 percent as a prophylactic against ocular infections in agriculture.** Viestnik Opht., 1937, v. 10, pt. 6, p. 865.

In his rural work the author found that conjunctival irrigations of 0.5 percent saline solution had an agreeable effect on chronic conjunctivitis and trachoma, so frequent among the agricultural population. Ray K. Daily.

Braunstein, H. E. **The problem of phototherapy in ophthalmology.** Viestnik Opht., 1937, v. 11, pt. 1, p. 86.

An experimental investigation was made on rabbits as to the effect of the ultraviolet light of the hydrogen tube, with a view to its clinical application. Experimental ulcers and tuberculosis of the cornea were exposed to this light, with the object of establishing dosage and the effect of overdosage. The data show that the radiation from the hydrogen tube, rich in short biologically active rays, is suitable for phototherapy of superficial corneal inflammations. The character of the radiation is incapable of penetrating deeply, which explains its ineffectiveness in tuberculous keratitis. The therapy of serpigenous ulcers requires massive, bactericidal doses of unfiltered rays. Overdosage brings no serious consequences, because the injury is superficial and transitory. Ray K. Daily.

Corrado, M. **The reaction of the ocular tissues following introduction of chemical and pharmacologic substances into the anterior chamber and vitreous.** Ann. di Ottal., 1936, v. 64, March, p. 145, Aug., p. 520, and Dec., p. 811; and 1937, v. 65, May, p. 361.

The author reviews the literature. He made a large number of experiments on the eyes of rabbits. The reaction to acids was greater than to alkalies. The reaction was greatest for the bichloride and the biniodide of mercury; much less for the iodo-electric colloids. Histologically the phlogistic effect was more or less intense. Solutions of higher concentration were required to produce a reaction of given intensity in the anterior chamber than in the vitreous. Best tolerated were iodides in the anterior chamber, physiologic solution of sodium chloride in the vitreous, and the electric colloids in both. (Bibliography.) Park Lewis.

Cossu, G. **The action of photodynamic treatment on experimental tuberculosis of the eye.** Arch. di Ottal., 1937, v. 44, March-April, p. 121.

Rabbits were used as experimental animals and tuberculous material was inoculated into the anterior chambers. The infection could be controlled or minimized by exposure to light from a carbon-arc lamp. Trypaflavine plus irradiation showed by histologic study of the globes that infection was controlled better than by exposure to the carbon arc alone. The author believes from the experiments that photody-

namic treatment in ocular tuberculosis would be fruitful in results.

H. D. Scarney.

Goldenburg, Michael. **Sulfanilamide in ophthalmology.** Amer. Jour. Ophth., 1938, v. 21, Jan., pp. 54-60.

Hambresin, L. **Fever therapy in ophthalmology,** Ann. d'Ocul., 1937, v. 174, Nov., pp. 721-744.

The use of malaria, Ducrey bacillus vaccine, pyrifer, a mixed bacterial extract, sulphur in oil, the Kettering hypertherm, and the short wave is discussed with indications, methods of administration, and reported results. Fever therapy is the only treatment of value in luetic optic atrophy. Judging from reported cases malaria therapy is the most effective in this condition although sulphur in oil seems also to be of value. Fever therapy is definitely useful in keratitis, uveitis, and postoperative infections. The Kettering hypertherm is still in the experimental stage but results have been very encouraging. John C. Long.

Hausmann, Gertrud. **Report on short-wave therapy at the First University Eye Clinic of Vienna.** Zeit. f. Augenh., 1937, v. 93, Nov., p. 213.

The author reports a summary of the experiences of the First University Eye Clinic of Vienna with short-wave therapy on 31 eye patients. With careful regulation of the dosage, all injury to the eye was avoided. Acute inflammatory processes responded best. The results in pyogenic affections were most striking. The experience with chronic inflammations was too small for definite evaluation of the procedure, but it seems that deep inflammations such as choroiditis are favorably influenced. F. Herbert Haessler.

Kliachko, M. L. **Observations on ambulatory surgery.** Viestnik Opht., 1937, v. 10, pt. 6, p. 884.

On the basis of 3,000 annual surgical procedures without hospitalization, performed in 1934-1935, the author holds that discissions and all operations on the ocular muscles, the lacrimal sac, and the lids, may be safely performed in this manner. Ray K. Daily.

Kravitz, Daniel. **The treatment of ocular syphilis.** Amer. Jour. Ophth., 1938, v. 21, Feb., pp. 176-181.

Pavlov, H. M. **The influence of the base on the bactericidal potency of ophthalmic ointments.** Viestnik Opht., 1937, v. 11, pt. 2, p. 226.

This laboratory investigation shows that the bactericidal properties of ophthalmic ointments increase with substitution of gylcerin for vaseline.

Ray K. Daily.

Poliak, B. V. **Relative evaluation of disinfectants used in ophthalmology.** Viestnik Opht., 1937, v. 11, pt. 1, p. 42.

A laboratory study to determine the bactericidal properties of Moiseev's silver sand and Schaufler's chloricide. Both substances exert oligodynamic properties, and are being developed to replace the more expensive imported antiseptics. Ray K. Daily.

Robitashvili, K. F. **Preoperative sterilization of the conjunctival sac by the Bietti method.** Viestnik Opht., 1937, v. 11, pt. 2, p. 230.

On the basis of 126 cases the author concludes that two percent yellow oxide of mercury is the most effective means of preoperative sterilization of the conjunctival sac. Ray K. Daily.

Woods, A. C., and Randolph, M.E. **Treatment of ocular tuberculosis.**

Arch. of Ophth., 1937, v. 18, Oct., pp. 510-526; also Trans. Amer. Ophth. Soc., 1937, v. 35.

This report is based on study of 175 patients with ocular tuberculosis treated with tuberculin or by other procedures at the Wilmer Institute. The findings are analyzed in the light of the newer knowledge of tuberculosis. The discussion includes the influence of allergy and immunity on tuberculous lesions, therapeutic action of tuberculin, diagnosis, the methods and results of treatment by tuberculin, general and climatic treatment, and special procedures such as paracentesis, autohemotherapy, phototherapy, and subconjunctival injections. The authors conclude that the desensitization concept for the action and use of tuberculin is correct, and that tuberculin should be used for a minimum of two years, and should be discontinued only if the skin has become almost totally nonreactive and the ocular lesion has been entirely quiet and apparently encapsulated for a period of a year or longer. Tests for cutaneous sensitivity should be made at three-month periods and tuberculin therapy again instituted upon any sign of return of cutaneous sensitivity. A limited experience with beta-ray radium therapy gave encouraging results. J. Hewitt Judd.

3

PHYSIOLOGIC OPTICS, REFRACTION, AND COLOR VISION

Barbel, I. E. **Studies with the anomaloscope of the Soviet Optical Institute.** Viestnik Opht., 1937, v. 11, pt. 1, p. 25.

This is a study in the recognition, differentiation, and memorizing of color with the object of demonstrating the relation between color vision and color memory. The detailed report shows clearly the association between these two functions. Color memory for yellow, green, and red is considerably lower in dichromates than in anomalous trichromates. This fact should be considered in vocational selection for work requiring color recognition and memory. Ray K. Daily.

Beach, S. J., and McAdams, W. R. **Benzedrine in cycloplegia.** 2. Further report. Amer. Jour. Ophth., 1938, v. 21, Feb., pp. 121-124.

Cavallacci, G. **The influence of luminous excitation of the retina on the rate of glycemia.** Arch. di Ottal., 1937, v. 44, March-April, p. 101.

Luminous excitation of the retina was found to alter the amount of glycemia in rabbits. The amount of glycemia was increased in the majority of cases. In a few cases a diminution was found. The author finds an explanation of his findings in the fact that the pituitary gland and hypothalamic centers are capable of producing hyperglycemia at times and at other times hypoglycemia. H. D. Scarney.

Cavallacci, G. **Familial hyperopia of high degree. Considerations on the etiopathogenesis of ametropia.** Arch. di Ottal., 1937, v. 44, May-June, p. 178.

Cases of high hyperopia are described. The author made craniometric studies and takes the view that an analogy exists between the morphology of cranium and eye. Hypermetropia was found to be associated with brachycephaly and myopia with dolichocephaly. H. D. Scarney.

Clemmesen, Viggo. **Measurement of accommodation.** Det oftalmologiske Selskab i Köbenhavn's Forhandlinger, 1936-1937, pp. 42-61. In Hospitalstidende, 1937, Dec. 21.

The author presents the underlying principles for determining the amplitude of accommodation, and the different methods advanced for carrying out the measurements. For comparison of the different methods, he has devised an apparatus of his own with which he has taken a great number of readings, mostly on himself. These readings are tabulated in detail. He considers that a reading of the accommodative range is satisfactory if it does not vary more than 1/10 diopter from the average of ten readings.

D. L. Tilderquist.

Cogan, D. G. **Accommodation and the autonomic nervous system.** Arch. of Ophth., 1937, v. 18, Nov., pp. 739-766; also Trans. Sec. on Ophth., Amer. Med. Assoc., 1937, 88th mtg.

Both theoretical and factual considerations are presented in support of the theory of dual innervation of the eye. The sympathetic system tends to adapt the eye for relatively distant objects and hence opposes the parasympathetic system which tends to adapt the eye for relatively near objects. The mechanism whereby the sympathetic system effects this adjustment is not obvious but it is suggested that the radial fibers of the ciliary muscle are innervated by the sympathetic system and on contraction exert a pull on the zonule which flattens the lens. They are opposed by the circular fibers which on contraction decrease the circumference of the ciliary ring and allow greater curvature of the lens. Evidence for dual innervation of the eye is presented by analogy, anatomico-physiologic factors, comparative anatomy, embryologic factors, neurologic factors (clinical observations on patients having had sympathectomy), and pharmacologic factors (effect on relative power of accommodation from subconjunctival injections of epinephrine hydrochloride). (Discussion.)

J. Hewitt Judd.

Corbett, H. V. **Hue discrimination in normal and abnormal color vision.** Jour. of Physiology, 1936, v. 88, Nov. 6, p. 176.

The author studied the hue-discrimination curves of ten trained and seventeen untrained normal observers. He finds that there are two real maxima of discrimination in the spectrum, one about 4,900 A. and the other about 6,000 A. In different individuals these maxima vary slightly in position, degree, and extent. These two principal maxima are still found even if the brightness of the two fields becomes unequal. They represent real hue discrimination.

The author states that the secondary maxima described by some workers are probably due to rapid decrease in brightness towards the extremes of the visible spectrum. The difference in brightness at other points of the spectrum causes a "shift" in color matching. The less bright color is matched in wave length with one farther away from the brightest part of the spectrum.

The author also studied defective color vision in one trained and five untrained observers. He finds that defective color vision is associated with only one maximum of discrimination, situated at about 4,900 A. Differences in intensity cause more difficulty in hue discrimination for the color blind than for those with normal color vision.

M. E. Marcove.

Dashevsky, A. I., and Booshmitch, D. G. **Optical decentration of the eye.** Amer. Jour. Ophth., 1938, v. 21, Feb., pp. 125-130.

Glees, M. **Cephalic index and refraction.** Arch. f. Augenh., 1937, v. 110, Nov., p. 642.

The author measured the cephalic index on 125 ametropes and ascertained that neither the form of the skull nor that of the orbits had any influence on the refractive anomaly.

R. Grunfeld.

Kravkov, C. V. **The effect of auditory stimulation on the color sensitivity of the protanope.** Viestnik Opht., 1937, v. 11, pt. 1, p. 102. (See Amer. Jour. Ophth., 1937, v. 20, Dec., p. 1272.)

Machemer, H. **A new rack of lenses for skiascopy.** Klin. M. f. Augneh., 1937, v. 99, Oct., p. 489.

The author describes a convenient light metal rack of spherical lenses for skiascopy in which the individual lenses are 13 mm. in diameter.

F. Herbert Haessler.

Marquis, D. G., and Hilgard, E. R. **Conditioned responses to light in monkeys after removal of the occipital lobes.** Brain, 1937, v. 60, p. 1.

Removal of the cortical visual center in rabbits or rats abolishes the discrimination of visual form and pattern but the animals can respond to the brightness and position of a stimulus object. Dogs are also able to discriminate light intensity after removal of the occipital lobes but give no evidence of distinguishing position and distance. Clinical observations show that destruction of the area striata in man produces a complete blindness in which even perception of light and dark is abolished. The significant difference between the dog and man made it desirable to investigate an intermediate species. Directly comparable data are available for the dog and monkey with respect to visual conditioned responses. In both animals the conditioned response, after bilateral removal of the area striata, is virtually unaffected.

After bilateral removal of the occipital lobes, including all of the area striata, the monkey behaves as if it were totally blind. A conditioned response to a light stimulus was established in three monkeys after removal of the occipital lobe, without any significant difference from the normal. In three monkeys, the conditioned response was established before removal of the occipital lobes. One monkey retained the response after operation. The other two reacquired the response with retraining. The similarity of the conditioned responses in normal and operated monkeys provides evidence that the visual cortex is not an essential part of the neural mechanism for responses to light stimuli.

Comparison of the effects of destruction of the area striata in rodents, dogs, monkeys, and man reveals a progressive encephalization of visual function in the mammalian series, with the greatest qualitative difference occurring between monkey and man. These results suggest that great caution is necessary in interpreting human cerebral function on the basis of animal experiments. Edna M. Reynolds.

Mukerjee, S. K. **Use of contact glass for cosmetic purpose.** Brit. Jour. Ophth., 1938, v. 22, Jan., pp. 43-45.

The case of a girl aged sixteen years, with left eye leucomatous as a result of smallpox when a small child, is cited. The case was not suitable for tattooing, as this had been attempted without success by two other ophthalmologists. Two photographs demonstrate the full effect of the lens as so used. D. F. Harbridge.

Scheerer, R. **On the genesis of high myopia. Relationship between excessive myopia and microphthalmos.** Klin. M. f. Augenh., 1937, v. 99, Nov., p. 689.

Since neither Fuchs in an essay that appeared in this journal nor Lindner in discussing that essay refers to Scheerer's publication on this topic, the latter feels called upon to point out that in his contribution to Lubarsch-Ostertag's Pathology, he records observations showing that the cause of many malformations at the nerve head in myopia is primarily congenital anomalies of the papillary anlage.

F. Herbert Haessler.

Semonovskaja, E. N. **The effect of adaptation of one eye on the peripheral light sensitivity of the other eye.** Viestnik Opht., 1937, v. 10, pt. 6, p. 868.

The peripheral light sensitivity of the left eye was tested after 45 minutes of dark adaptation of both eyes and a 30-minute exposure of the right eye to light. The findings show that the sensitivity of one eye rises with the intensity of the stimulus in the other eye, up to fifty foot-candles. With further rise in the intensity of illumination the sensitivity of the other eye falls, but it still remains above normal for the 45 minutes of dark adaptation. When the illumination exceeds 600 foot-candles, sensitivity falls below normal. This demonstrates that a positive stimulus beyond a certain intensity may act as an inhibitor. Colored stimuli, unlike white light, diminish the sensitivity of the other eye. Least inhibiting are yellow and orange light, and the inhibitory effect increases toward each end of the spectrum. These reactions diminish if the macula of the illuminated eye is not stimulated. The author believes himself thus to have demonstrated that the rod apparatus of one eye may be activated by a stimulus which excites the entire perception apparatus of the other eye. If the stimulus excites only a part of the perception apparatus the stimulating action on the other eye diminishes and may pass into an inhibitory effect.

Ray K. Daily.

Stewart, D. S. **Ocular headache.** Brit. Med. Jour., 1937, July 10, pp. 59-61.

For the benefit largely of the general practitioner, the author lists the various ocular errors that may cause headache, and rough means of testing for them. It is pointed out that appreciation of pain and pleasure is very much a matter of temperament and that one has to be very careful in concluding how much discomfort the patient is really having. Ralph W. Danielson.

Sudranski, H. F. **A proposed instrument for the objective measurement of the retinal image.** Amer. Jour. Ophth., 1938, v. 21, Jan., pp. 63-64.

Teplov, B. M. **Indirect changes in the absolute and differential sensitivity of the eye.** Viestnik Opht., 1937, v. 11, pt. 1, p. 106.

The objective of this study in the laboratory of physiologic optics was to verify the following two contentions: Spencer's, that the absolute sensitivity to a definite stimulus rises in the presence of a second subminimal stimulus; and Heiman's, that the absolute sensitivity falls in the presence of a second supraminimal stimulus. The author's investigation on the effect of an accessory stimulus on the threshold of perception confirmed the findings of the previous investigators. With a weak additional stimulus the sensitivity rises, with an increase in the stimulus above a neutral point the sensitivity falls, and with a further increase it rises again.

These findings are in agreement with Pavlov's law "that a weak irritant creates irradiation; a moderate one, concentration; and a strong one, again irradiation." Ray K. Daily.

Wang, Ging-Hsi. **Latency of cortical and retinal action potentials induced by illumination of the eye.** Arch. of Neurology and Psychiatry, 1937, v. 37, April, p. 772.

A comparative study was made of the latency of cortical potentials following exposure of rabbit eyes to light. The animals were placed under dial anesthesia.

The difference in the latent period of a cortical potential in response to lighting the lamp was still 50 percent longer than that of the cortical potential induced by exposure to the same lamp already lighted. (Table.)

F. M. Crage.

Wright, W. D. **Hue discrimination and its relation to the adaptation of the eye.** Jour. of Physiology, 1936, v. 88, Nov. 6, p. 167.

Experiments are described in which the eye is adapted to a fairly high intensity, and is then allowed to view momentarily a field of color containing two different wave lengths. The wavelength change required to produce a just noticeable difference of hue is determined with the eye adapted to various color intensities, and from test colors selected at three different points in the spectrum. In this way adaptation is controlled in a known manner, and its effect on hue discrimination determined. M. E. Marcove.

Young, A. L. **Stenopeic spectacles.** Brit. Jour. Ophth. 1938, v. 22, Jan., pp. 45-46.

In the type of spectacle presented, two discs back to back, rotated separately and each having a curved slit, may be accommodated to any need. Held firmly by rims, the possibility of accidental movement is avoided. (Illustration.) D. F. Harbridge.

4

OCULAR MOVEMENTS

Bell, Charles. **On the motions of the eye in illustration of the uses of the muscles and nerves of the orbit.** Med. Classics, 1936, v. 1, Oct., p. 173.

(This paper was read on March 20, 1823.) It shows with how much thoroughness the author studied the motions of the globe. Some anatomic and physiologic facts and reasons which we now take for granted are discussed in detail, including the difference between rest and activity. M. E. Marcove.

Curdy, R. J. **Equal advancement and recession operation for horizontal strabismus.** Arch. of Ophth., 1937, v. 18, Nov., pp. 802-806.

Because one muscle is set back the same number of millimeters that the antagonist is advanced, there is little or no tension on the fixing sutures during the operation or during the healing process. This fact results in greater exactness of result. The sutures are first inserted for the advancement, then the recession is done and the advancement completed. By following this sequence, tension on the sutures is avoided at all times. The author describes the steps of his operation in detail, and illustrates them by drawings.

J. Hewitt Judd.

Davis, W. T. **Diagnosis and treatment of the phorias.** Amer. Jour. Ophth., 1938, v. 21, Feb., pp. 145-160.

Dawson, J. B. **Nystagmus associated with hyperemesis gravidarum.** Jour. of

Obstetrics and Gyn. of the British Empire, 1937, v. 44, Aug., pp. 731-734.

The author reports thirteen cases of hyperemesis gravidarum, seven of which were of moderate severity and showed no nystagmus. The remaining six were all very severe cases, relieved only by termination of pregnancy. In four of the six severe cases horizontal nystagmus was present. The author believes this to be a sign of severe toxemia. Ralph W. Danielson.

Harms, Heinrich. **Place and manner of image-suppression in squint.** Graefe's Arch., 1937, v. 138, pts. 1 and 2, p. 149.

An accidental observation gave the author an opportunity to become concerned with suppression of the image from one of the eyes in squint. Examination of a patient with alternating squint having good visual acuity in each eye was being carried out in a moderately bright room before a Maddox cross. In the center of the cross burned as usual an electric light which facilitated fixation and testing for diplopia. With the right eye fixed upon the light, the left eye was directed upon the figure 8 of the scale, indicating thereby the amount of the squint angle. When fixation was changed from the right eye (directed at the light) to the left eye (directed at the figure 8 on the scale), no movement of the eyeballs occurred but the pupils were contracted in the former and dilated in the latter procedure. Therefore, when perception of the light was not possible to the right eye because it squinted and its foveal region was suppressed, there was also absence of pupillomotor stimulation from this suppressed fovea. Examination of cases of squint of all kinds has convinced the author that suppression of the image in squint takes place in the retina. Its extent and intensity were dependent upon the sensory condition of the retina. In cases of normal correspondence, it was strongest and probably affected all impressions of the squinting eye. In the presence of an anomalous association of visual direction, it was only regional but was always present in both eyes. Demonstration of a regional suppression indicated the presence of an anomalous relation. The stability of the suppression was individually different. Squint cases with and without amblyopia behaved fundamentally alike in the act of vision: they differed only that in amblyopia the defects of the visual field and the diminution of pupillomotor excitability of the retinal center persisted even when covering the directing eye. The manifestations of suppression, although occurring in the retina, were referable to a uniform central influence. This influence must result through centrifugal fibers in the visual tract going to the retina. The amblyopia resulted not ex anopsia but from persistent absolute suppression of the macular region.

H. D. Lamb.

Jameson, P. C. **Surgical management of ptosis, with special reference to use of the superior rectus muscle.** Arch. of Ophth., 1937, v. 18, Oct., pp. 547-557; also Trans. Amer. Ophth. Soc., 1937, v. 35.

The operations previously advocated for this condition are reviewed and a new operation is described for those cases in which the superior rectus may be utilized. It varies from the Motais technique in that the entire strength of the unmutilated superior rectus muscle is used. After the lid is everted the superior rectus muscle is dissected out but not detached. Two double-armed sutures are introduced from under the surface; the farther back on the muscle

these are introduced, the greater the shortening. An incision is made directly into the cartilage about 2 mm. below the upper surface of the tarsus. A pocket is made between the orbicularis muscle and the tarsal surface. The superior rectus muscle is folded on itself by being dawn into the pocket. Traction is made until the insertion of the muscle approximates the primary incision of the cartilage. Sutures are passed between the surface of the tarsus and the orbicularis muscle and are tied at or near the intermarginal space. Increased gradation can be obtained by placing the aperture of the pocket lower down on the tarsus, introducing the two double-armed sutures farther back on the superior rectus muscle, and approximating the end of the muscle (by traction) nearer the intermarginal space. If more secure anchorage is desired, mattress sutures may be introduced underneath the lid through the cartilage and the muscle and tied over pads on the outer surface of the skin. (Drawings.)

J. Hewitt Judd.

Kahoun, Svatopluk. **Paralysis of oculomotor nerves following grippe.** Ceskoslovenska Ofth., 1937, v. 3, no. 2, pp. 109-116.

In five years at the Brno Eye Clinic, eight cases of paralysis of the oculomotor apparatus due to grippe have been studied. The paralysis occurred during convalescence and had a benign course. Only one case showed in the beginning of the disease a paralysis of all of the muscles of the right eye, which did not improve. In numerous cases other nerves were affected. One case of Horner's syndrome was observed. Of seven cases, four had intraocular neuritis and one had bilateral perineuritis with slight symptoms of optic neuritis. In one case a pure retrobulbar neuritis was discovered. Most cases recovered with almost normal vision. Paralysis of accommodation has been seen as a grave complication of grippe. Georgiana D. Theobald.

Malbran, J., and Adrogué, E. **Divergence excess.** Arch. de Oft. de Buenos Aires, 1937, v. 12, Nov., p. 741.

In the majority of cases of divergent strabismus there is no diplopia and the image of the deviating eye is absolutely suppressed. The patients complain subjectively of general symptoms, including frequently gastric disturbances, indicating a neuropathic constitution. They know of the deviation only because of the observations of their friends. The condition reveals itself to the examiner by the marked deviation of one eye during retinoscopy, when the patient is asked to fix a distant object to relax his accommodation. The Maddox rod, synoptophore, and phorometer are not reliable in this condition. The only reliable tests are the cover test, the parallax test and the prolonged-occlusion test.

In the case reported, the deviation was of 55 degrees in one and of 60 degrees in the other, in fixation at 40 meters; and prism abduction amounted to 16 degrees. The most interesting observation was a constantly fluctuating but homonymous separation of the after-images varying between about 30-40 degrees and normal correspondence. M. Davidson.

Malbran, J., and Adrogué, E. **Measuring the deviation in strabismus.** Arch. de Oft. de Buenos Aires, 1937, v. 12, Oct., p. 642.

In reviewing the subject, attention is called to the improper use of the term torsion for rolling of the eyes on their

antero-posterior axes. Application of the after-image test, whenever possible, is the most certain method. Noncomitance, as Tschermak has pointed out, is believed to exist in the majority of cases, and when over ten degrees offers no promise from orthoptic training.

M. Davidson.

Martin, H. G. **Measurement of the angle of maximum convergence.** Amer. Jour. Ophth., 1938, v. 21, Feb., pp. 161-165.

Ohm, J. **Fundamental plan of ocular motion.** Part 1. **The conjugate horizontal movements of the eyes.** Graefe's Arch., 1937, v. 138, pts. 1 and 2, p. 1.

The author presents a simple and concise summary of the physiology and pathology of the intracranial paths and centers for conjugate horizontal deviation and nystagmus. The principal direct source of impulses to the eye muscles is the vestibular nuclear apparatus. All tracts carrying impulses to the latter are supravestibular and those which connect it with the nuclei of the ocular muscles are infravestibular. Of the latter, the most important is the posterior longitudinal bundle.

Let it be imagined that the right and left lateral semicircular canals lie in a horizontal plane around the eye. Then if in the dark the examined individual is turned toward the right, the endolymph in the right semicircular canal moves toward its ampulla and in the left canal away from its ampulla. Right nystagmus is produced by: (a) turning the body toward the right, either by the right semicircular canal alone from a current toward the ampulla, or by the left semicircular canal alone from the ampulla; (b) syringing the right ear with hot water or the left ear with cold, in which the currents are directed as in (a); (c) removal of the left labyrinth or cross section of the left vestibular nerve; (d) as the compensatory nystagmus of Bechterew.

Jerking nystagmus is a process of discharge of the vestibular nucleus, not associated with an inviolability of the vestibular nerves. The nuclei are never completely inactive. Even in the condition of "rest" the vestibular nuclei are being stimulated.

The vestibular innervation of the eye-muscles is reciprocal. That is, when the agonists contract, the antagonists relax. When the eyes are turned toward the left after looking straight ahead, the left external rectus and right internal rectus contract while the left internal rectus and the right external rectus relax and lengthen. If the rectus muscles turning the eye toward the right or the left become paralyzed, the eye is able to reach the midline as a result of elongation of the antagonist muscles.

The author considers the process of oscillation in the cells of the vestibular nuclei as a seesawing of energy. When these cells send a strong impulse to the muscles turning the eyes toward the left, they inhibit the energy turning the eyes toward the right. Therefore there must exist an uncrossed infravestibular pathway from the right nucleus to the nuclei of the oculomotor nerve for muscles turning the eyes toward the right.

Followed centralward, the reflex path for jerking nystagmus to the right toward the fovea and for jerking nystagmus to the left away from the fovea runs from the left half of each retina, through the left optic tract, the left external geniculate body, the left optic radiations, and the left visual cortex. The reflex path for jerking nystag-

mus to the left toward the fovea and for jerking nystagmus to the right away from the fovea extends similarly from the right halves of the retinae to the right visual cortex. In the large pyramidal cells of the motor or third division of the visual cortex begin the descending motor visual radiations or the optic or optokinetic pathway for conjugate turning of the eyes. This descending optokinetic tract lies ventrally and medially to the ascending optic radiations, and extends to the posterior end of the internal capsule, where it bends ventrally in the lateral part of the base of the peduncle and the pons, lateral to the pyramidal tract. It crosses to the opposite side at about the level of the abducens nucleus, passes dorsally, undergoes an interruption in the formatio reticularis, and enters the vestibular nucleus. H. D. Lamb.

Ohm, J. **The study of nystagmus.** 43rd communication. **Nystagmus and squint in coloboma and microphthalmos.** Graefe's Arch., 1937, v. 138, pt. 3, p. 286.

Among 22 individuals examined, there were 36 eyes with coloboma. In 11 of these 22 persons microphthalmos also existed, being bilateral in four and unilateral in three. Of nine other individuals examined, microphthalmos was bilateral in four and unilateral in one, while microcornea was bilateral in one and unilateral in two. In each individual with bilateral malformations, the vision was almost always different in the two eyes and sometimes very much so. Nystagmus was present in all the 31 cases except one, although in six persons out of the 22 no notation regarding nystagmus had been made. Observations of these cases had occurred from 1907 to the time of report. The nystagmus was horizontal in seventeen patients, obliquely down and to the right in two, in other directions in single cases. Jerking nystagmus occurred seventeen times, pendulum oscillations three times, and jerking alternating with pendulum swinging four times. Where the vision differed between the two eyes, the rapid motion of the jerking nystagmus was almost always directed toward the side of the better eye.

As regards strabismus, convergent squint was present ten times, convergent with negative vertical divergence (that is, the right eye lower) three times. Divergent squint occurred twice and divergence with negative vertical divergence once. In eleven cases, squint was not mentioned.

H. D. Lamb.

Pilman, N. I., and Alexandrova, A. E. **Periodic automatic contraction of paralyzed ocular muscles, in congenital or acquired paralysis of the oculomotor.** Viestnik Opht., 1937, v. 11, pt. 2, p. 203.

The author adds a sixth case of paralysis of the oculomotor with periodic contraction of the upper lid to five reported in the literature. Of the six cases thus on record three were congenital, and three developed in infancy. Five were unilateral and one bilateral. The phenomenon is the same in all cases. The eyelid twitches for a while, the paralyzed lid is elevated, the palpebral fissure is widely opened, the pupil narrows, the eyeball makes a slight rotary and abductive motion, and the ciliary muscle contracts. After several seconds the lid droops, the pupil dilates, and accommodation is paralyzed. The paralyzed phase lasts from one to twenty minutes, and the phenomenon continues during sleep. The author explains the pathogenesis of this phenomenon by atavism of smooth

muscle tissue, which, deprived of its motor innervation, reverts to a primitive state, in which it is stimulated to contraction by local chemical products of metabolism. Ray K. Daily.

Raab, Kornél. **The question of refusion.** Klin. M. f. Augenh., 1937, v. 99, Oct., p. 475.

The convergence impulse associated with accommodation often (even with emmetropia and orthophoria) fails to rotate the eyeballs sufficiently to adjust them for the intended point of fixation. This "physiologic exophoria" is compensated by a fusional convergence impulse. In case of need, convergence can be increased still more and the range through which it can be varied while accommodation is kept constant is called relative convergence. However, in increasing the convergence in such an experiment, we come to a point of indistinct vision (which can be cleared by minus spheres) before we induce diplopia. This results from stimulation of the accommodation by the convergence, and is strictly the end point in measuring the upper limit of relative convergence. By gradually decreasing the prisms which induced diplopia, the images coalesce, and this point is a measure of refusion (recovery point of Pascal). These manifestations were independently observed by Pflimlin and Struben, using a modified haploscope and presenting results to show maximal, indistinct, and refusional convergence for a series of distances of accommodation expressed in fractions of a meter. Peculiarly the curves of indistinctness cross the refusion curve in many subjects. Raab made similar studies, using a synoptiscope, and found that this was not true in every case.

Refusional convergence seems to be a measure of muscle tonus, since it varies with fatigue and general bodily tone and can be increased with practice. From the position of the point of indistinctness, which is the upper limit of the relative convergence range, one can infer the amount that tonus can be increased. In some individuals a primary and secondary point of refusion can be distinguished. The primary one is determined by the persistence of ability to respond with convergence to increased accommodation. The secondary depends on muscle tonus. One can distinguish clinically between simple hypotonic and accommodatively compensated hypotonic forms of convergence insufficiency. Crossing of the curves of indistinctness and of refusion is not the rule. F. Herbert Haessler.

Rubiora, L. and Miranda, A. G. **Pathogenesis of miner's nystagmus.** Klin. M. f. Augenh., 1937, v. 99, Oct., p. 491.

The authors discuss this topic in less than two pages without new facts or concepts. They lay greatest stress on the necessity for adequate ventilation of the mine. F. Herbert Haessler.

Sala, Guido. **The pathogenesis of isolated paralysis of the abducens nerve.** Ann. di Ottal., 1937, v. 65, May, p. 377.

The author emphasizes the position of the two sixth-nerve nuclei in the floor of the fourth ventricle, and the fact that the entry and exit of the nerve through the vena cava render it especially vulnerable to toxic substances in the venous blood. The deep submergence of the nuclei in the basal tissues suggests that it is the substance of the nerve which is generally affected rather than its roots. Congenital defects in the epithelial covering of the nerve fibers may more readily expose them to toxic injury. (3 plates, bibliography.)

Park Lewis.

Spiegel, E. A., and Scala, N.P. **Ocular disturbances associated with experimental lesions of the mesencephalic central gray matter, with special reference to vertical ocular movements.** Arch. of Ophth., 1937, v. 18, Oct., pp. 614-632; also Trans. Sec. on Ophth., Amer. Med. Assoc., 1937, 88th mtg.

Clarke's stereotaxic apparatus was used for stimulation experiments as well as for the production of circumscribed lesions, on thirty cats. Results of these experiments showed that stimulation of the central gray matter around the aqueduct of Sylvius below the cranial part of the anterior quadrigeminal body may yield constriction or dilatation of the pupil according to whether the pathway of the light reflex or the descending vegetative tracts originating in the hypothalamus are stimulated. Lesions of the central gray matter in this level produce transitory disturbances of the light reflex. Stimulation of the central gray matter below the posterior commissure or behind this level produces conjugate downward movements of the eyeballs and stimulation of the posterior part of the optic thalamus or in the medial part of the tectum of the anterior quadrigeminal body causes upward movements. Destruction of the central gray matter in the cranial part of the mesencephalon and the pretectal region induces loss of upward and downward movements on cortical stimulation. The tectum mesencephali is not necessary for the transmission of impulses for vertical ocular movements from the frontal lobe to the nuclei for the ocular muscles. Therefore, paralysis of vertical conjugate movements in diseases of the dorsal part of the mesencephalon with intact nuclei for the ocular muscles should be regarded as a local symptom of a lesion of the region around the aqueduct of Sylvius or of closely adjacent systems but not as a local symptom of a lesion of the tectum. (Discussion.) J. Hewitt Judd.

Tennent, J. N. **The modern treatment of squint.** Glasgow Med. Jour., 1937, v. 9, p. 166.

Four stages in the treatment of squint are described: (1) refraction, (2) occlusion, (3) orthoptic training, (4) operation. The advantages of orthoptic training before and after operation are emphasized and orthoptic treatment in school clinics is urged.

Edna M. Reynolds.

Torres Estrada, Antonio. **Treatment of strabismus.** Anales de la Soc. Mexicana de Oft., 1937, v. 12, July-Sept., pp. 17-48.

This is a detailed consideration, with many illustrations, of operations for strabismus. The author uses advancement, resection, and lengthening of the antagonist. His suture is a modification of Worth's. W. H. Crisp.

Velhagen, K., Jr. **The convergence factor described by Comberg.** Klin. M.f. Augenh., 1937, v. 99, Oct., p. 486.

In 1930 Comberg suggested the possibility of a convergence impulse independent of accommodation, based on the fact that he found discrepancies between measurements on the tangent screen and some taken with a precision instrument which he devised for measuring the angular position of the eyeballs. He interpreted this increased convergence as a primitive searching reaction of the eyes which brings about a tonic involuntary deviation.

As a repetition of his experiments Velhagen compared measurements on 31 flyers, taken with Bielschowsky's prism apparatus and Stock's phorom-

eter. From the table given, it becomes clear that the phorometer, in which the patient has a definite psychic impression of being adjusted for near vision, records higher convergences. For practical purposes, this shows the great importance of psychic factors in the investigation of heterophoria.

F. Herbert Haessler.

Watrous, W. G., and Olmsted, J. M. D. **Muscle weakening by central tenotomy.** Amer. Jour. Ophth., 1938, v. 21, Feb., pp. 182-184.

Zamuravkin, G. I. **Surgery of high degrees of strabismus.** Viestnik Opht., 1937, v. 11, pt. 1, p. 81.

The author's preference is for tenectomy, supplemented if necessary a few days later by tenorrhaphy of the opposing muscle. Ray K. Daily.

5

CONJUNCTIVA

Agnello, Francesco. **Reticulo-plasmocytes of the conjunctiva in degenerative trachoma.** Rassegna Ital. d'Ottal., 1937, v. 6, July-Aug., p. 457.

The author describes a case of extensive conjunctival hyperplasia, developing in a symmetrical form, in a man of forty years whose trachoma was in the phase of hyalin and amyloid degeneration. Histologic examination, particularly with the Unna-Pappenheim stain, demonstrated a large percentage of plasma cells. Concerning their significance, the author feels that trachoma need not always be regarded as a specific stimulus in the production of plasma-cell hyperplasia, but only as an inflammatory stimulus, and he holds that other general causes, humoral or infective, can lead to plasma-cell increase. These cells seem to play an important part in the modification of protoplasm into hyalin substance. (4 figures.) Eugene M. Blake.

Bonnet, P., and Bussy, J. **Diffuse infiltration of the cornea and conjunctiva by cholesterin crystals.** Bull. Soc. d'Opht. de Paris, 1937, Jan., pp. 53-55. (See Section 6, Cornea and sclera.)

Cavallacci, G. **Granuloma of the limbus from sporotrichium.** Arch. di Ottal., 1937, v. 44, July-Aug., p. 247.

The author describes a limbus granuloma which had followed a blow by a willow-tree branch two months previously. The sporotrichium was isolated and cultured on various type media, and inoculations were done on laboratory animals from which the fungus was subsequently recovered.

H. D. Scarney.

Cole, O. W. **A review of trachoma.** United States Naval Med. Bull., 1937, v. 35, July, pp. 322-327.

This is a review of recent theories regarding the etiology of trachoma, and recognized treatments. Trachoma is uncommon among the personnel and dependents of the United States Navy.

Ralph W. Danielson.

Cornet, Emmanuel. **Cornet's classification of trachoma simplified for current usage.** Rev. Internat. du Trachome, 1937, v. 14, July, p. 178.

The author presents a simplified classification based purely on clinical considerations. He divides trachoma into five stages which correspond to MacCallan's well known classification except that MacCallan's second stage is divided into two parts.

J. Wesley McKinney.

Cornet, Emmanuel. **Pannus and interstitial keratitis.** Rev. Internat. du Trachome, 1937, v. 14, July, p. 198.

Three degrees of pannus are described: (1) a thin pannus superficial to Bowman's membrane, (2) a thick pannus involving Bowman's membrane, and (3) one involving Bowman's membrane and at the same time intracorneal. This last is a trachomatous interstitial keratitis. In the presence of a negative Wassermann reaction this interstitial keratitis is to be regarded as trachomatous. A typical case is cited.

J. Wesley McKinney.

Cornet, Emmanuel. **Principles of treatment of trachoma, different methods of treatment.** Rev. Internat. du Trachome, 1937, v. 14, July, p. 183.

The author begins by saying that the treatment of trachoma is not standard and that there are no certain specific medicaments. He stresses the importance of adapting the treatment to the pathologic conditions and the stage of the disease. He gives an extensive outline of most of the methods that have been used. J. Wesley McKinney.

Cornet, Emmanuel. **Trachoma of the fornix or cul-de-sac.** Rev. Internat. du Trachome, 1937, v. 14, July, p. 194.

The fornices are always the primary focus of trachoma, and conjunctival, tarsal, or limbal involvement is secondary to this. The author has seen many cases in which the upper cul-de-sac alone has been involved in undoubted trachoma. J. Wesley McKinney.

Derkač, V. **The etiology of trachoma.** Klin. M. f. Augenh., 1937, v. 99, Nov., p. 596.

Members of the family of Rickettsias are demonstrably or probably the etiologic agents in several severe diseases; namely, spotted fever, Rocky mountain fever, and pseudotyphus. There is some evidence to suggest that trachoma too is caused by a Rickettsoid body and that the louse is intermediate host. It seemed theoretically likely that the blood of trachoma patients might show the same agglutination phenomenon that Weil and Félix described as characteristic although not specific for spotted fever. The author found this to be true in five of twenty trachoma patients. The result is suggestive, not conclusive, and he hopes that workers in other trachoma regions will be stimulated to repeat this work.

F. Herbert Haessler.

Derkač, V. **Search for a specific treatment of trachoma.** Graefe's Arch., 1937, v. 138, pt. 3, p. 270.

Patients were chosen with early granular trachoma having no secretion and after as little as possible previous treatment. On the arm or forearm, after an incision in the skin 0.5 cm. long, a little pocket was prepared under the skin. From the fornix, a fold of the conjunctiva affected with trachoma was excised with scissors and implanted into the pocket in the arm. Such implantations were carried out in 29 patients altogether, for the most part autoimplantations. It was found that several implantations of trachomatous tissue in young trachoma paients, 10 to 14 years old, in whom the lymphatic tissue was still strongly developed, made these patients insensitive to the existing trachoma. The conjunctival disease, with ganules not yet ripe, disappeared, and the patients became resistant to reinfection.

H. D. Lamb.

Dressel, E. G. **Tularemia—bacteriologic facts.** Klin. M. f. Augenh., 1937, v. 99, Nov., p. 579.

Tularemia is originally a disease of small rodents but the commonly hunted upland birds and most barnyard ani-

mals may become infected. Cattle may be carriers without themselves becoming ill. The disease is transmitted by deer flies, horse flies, ticks, lice, bedbugs, and mosquitoes.

Considering the widespread chance of infection, the small number of human infections is surprising. Direct transmission from man to man has not been observed. Portal of entry may be skin, mucosa, tonsil, and conjunctiva. The incubation period is three to four days.

The organism is a small, pleomorphic nonmotile gram-negative rod which does not form spores. It is sensitive to heat, but withstands drying and can be frozen for three weeks. It does not grow on ordinary media, but grows on glucose-blood-cystin-agar of pH 6.8-7.3. It is related to the organism of hemorrhagic septicemia, pest, fowl cholera and mouse septicemia. It is also similar to the organism of pseudotuberculosis. Diagnostically, agglutination of the blood serum is important. It becomes positive in the second week, reaches its height in the third, and remains for several years. F. Herbert Haessler.

Eilers, P. G. **Fifteen years with trachoma among the Indians.** Southwest Med., 1936, v. 20, Dec., p. 457.

A brief description of the various forms of trachoma is given and the medical and surgical treatment used are discussed. Application of 10 percent quinine bisulphate is recommended as the best form of medical treatment. Grattage of the lid with gauze or a curette followed by boric irrigations and instillations of argyrol is recommended as the best form of surgical treatment. In old cases of trachoma, tarsectomy is performed without suturing the conjunctiva. Dionin in 20 percent solution or in pure form is used in treatment of pannus, with peridectomy or cauterization of vessels at the limbus in persistent pannus.

Edna M. Reynolds.

Gala, A. **Hyalin-amyloid degeneration of the conjunctiva.** Ceskoslovenska Ofth., 1937, v. 3, no. 1, pp. 52-55.

An eleven-year-old boy presented himself with a tumor-like affection of the conjunctiva of the left upper lid and eyeball. The condition dated from early childhood. No trachoma symptoms appeared. Radical extirpation was done. Histologically, there was chronic inflammation with hyalin and amyloid degeneration, plasma cells, and lymphocytes.

Georgiana D. Theobald.

Hynie, Jiri. **Microörganisms of Ochi in trachomatous tissue.** Ceskoslovenska Ofth., 1937, v. 3, No. 2, pp. 139-140.

In working over a great amount of histologic material at his disposal, Ochi found in trachomatous conjunctiva and pannus gram-positive organisms which he considered the trachoma excitant. In twelve cases in the Bratislava Clinic, having fresh granulations, it was impossible to prove the presence of microorganisms. The staining method is a very sensitive delicate one. The negative results may have been due to errors, Ochi points out.

Georgiana D. Theobald.

Jess, Adolf. **Tularemia from the clinical viewpoint.** Klin. M. f. Augenh., 1937, v. 99, Nov., p. 577.

Tularemia is a conjunctival infection which might suggest acute trachoma or conjunctival tuberculosis. The early appearance of fever, malaise, anorexia, and swelling of the preauricular gland is characteristic. The glandular swelling may persist for weeks after the conjunctiva has healed. Aside from the

oculoglandular form, three others occur; namely, the ulceroglandular which begins with ulcers in the skin, the glandular, and the typhoid. The course is protracted and may end in death. The portal of entry is usually the eye. Patients are usually infected when skinning a rodent, but eating insufficiently cooked meat is a possible mode of infection. Although originally a disease of rodents, also endangered are pheasants, partridges, foxes, dogs, cats, pigs, and sheep as well as human beings.

F. Herbert Haessler.

Johnston, Wilson. **Colon-bacillus infection of the conjunctiva.** Amer. Jour. Ophth., 1938, v. 21, Feb., pp. 185-187; also Trans. Pacific Coast Oto-Ophth. Soc., 1937, 25th mtg.

Krümmel, H. **Trachoma-transmission experiments on rabbit's eyes.** Arch. f. Augenh., 1937, v. 110, Nov., p. 631.

Following an incubation period of from 4 to 21 months after injection of a suspension of trachomatous material into the vitreous of rabbits, folliculosis of the conjunctiva of the same eye developed, and somewhat later of the non-inoculated eye. No follicles were found in the eyeball itself. In one case, however, 21 months after inoculation a bilateral folliculosis was accompanied by sympathetic ophthalmia of the non-injected eye, with typical histologic findings. R. Grunfeld.

Melzer, R. L. **The alkalinity of tears in trachoma.** Viestnik Opht., 1937, v. 11, pt. 2, p. 213.

The author studied the pH of tears in twenty cases of trachoma. In twelve cases of chronic trachoma without inflammatory symptoms the pH was normal. With increase in the inflammatory symptoms the pH falls; and the most acid tears were found in a case of corneal ulcer. Ray K. Daily.

Motolese, Alfonso. **Contribution to the study of tuberculosis of the conjunctiva.** Boll. d'Ocul., 1937, v. 16, Sept., pp. 895-917.

A man fifty years of age showed a neoplasm in the lower external quadrant of the right eye. It was elevated about 1 mm., had a pinkish-yellow color, and numerous large blood vessels converged toward it. The Pirquet reaction was positive. A biologic test in a rabbit, and histologic examination of the excised conjunctiva, revealed it to be of tuberculous origin. Personal and family history were negative for tuberculosis. (Bibliography.)

M. Lombardo.

Pelláthy, B., and L. Németh. **A rare conjunctival lesion suggesting concretion.** Klin. M. f. Augenh., 1937, v. 99, Dec., p. 809.

In this fifty-year old patient with bilateral ptosis, both upper eyelids were greatly swollen. The conjunctiva near the lid edge was normal in color, but the tarsal conjunctiva and that of the contiguous fornix were thickly studded with yellow masses that looked like concretions and varied in size from punctate to several millimeters in diameter. In turning the lid, some of them ruptured and a yellow semifluid friable substance escaped. The authors excised the affected parts of the conjunctiva, and in two weeks the lids were normal in thickness and position. Histologic preparations showed greatly thickened conjunctiva studded with lumina lined with cuboidal epithelium. No similar findings seem to have been reported. F. Herbert Haessler.

Poleff, L. **The newest achievements in investigation of trachoma.** Klin. M. f. Augenh., 1937, v. 99, Nov., p. 584.

One of the difficulties in the experimental investigation of trachoma was impossibility of infection of small laboratory animals. Szily has succeeded in producing a follicular conjunctival lesion by intraocular and intracranial inoculation of chickens, rabbits, and guinea pigs. The follicles do not differ in important characteristics from human trachoma lesions but exhibit one pathognomonic sign; namely, scar formation.

Rickettsoid bodies first described by Busacca and studied by Cuénod and Nataf have great similarity with some of the constituents of inclusion bodies. The structures were demonstrated by Cuénod in lice that had been infected with trachoma material, and like true Rickettsia were cultivated in them. With suspensions from the intestinal contents of such lice, monkeys and men have been given typical experimental trachoma.

Poleff has achieved pure cultures of these virus-like bodies in tissue cultures in vitro, which leaves little doubt that they are alive. The occurrence of the Rickettsoid structures in trachoma-tissue cultures suggests their identity with the elementary bodies of the Halberstaedter-Prowaczek-Lindner complex. In animal experiments pure cultures of Rickettsoid bodies produce intraocular follicles with bulbous atrophy after vitreous inflammation in the rabbit, and descemetitis after introduction into the anterior chamber. The virus multiplies when inoculated into the guinea-pig testicle and grows on explanted vaginal tissue in vitro. The similarity between such pure cultures and Cuénod's findings makes the etiologic rôle of this hypothetic trachoma organism most probable.

F. Herbert Haessler.

Rollin, Jean L. **The genesis of plasmoma.** Zeit. f. Augenh., 1937, v. 93, Nov., p. 181.

The author describes the clinical and histologic characteristics of a large tumor of the conjunctiva which consisted of plasma cells. These cells are usually associated with inflammation. The similar cells seen in myeloma and plasmoma must be considered as plasma-cell-like elements. They are probably derived from lymphoblasts, whereas true plasma cells originate in lymphocytes. F. Herbert Haessler.

Trapezontzewa, C. **Trachoma and the Bacterium granulosis Noguchi: reaction of agglutination in trachoma.** Rev. Internat du Trachome, 1937, v. 14, July, p. 204.

A new method of agglutination reaction with the serum of patients is described, with the hope that it will be improved upon so as to be valuable in the diagnosis of trachoma. No definite etiologic value can yet be given to the Bacterium of Noguchi.

J. Wesley McKinney.

Trapezontzeva, E. E. **Trachoma and Bacillus granulosis Noguchi.** Viestnik Opht., 1937, v. 10, pt. 6, p. 844.

The author questions the conclusions of the Russian investigators, because the strains of Bacillus Noguchi used were not authentic. Ray K. Daily.

Tristaino, L. **Contribution to the study of tuberculosis of the conjunctiva.** Boll. d'Ocul., 1937, v. 16, Sept., pp. 948-962.

Three months after an inflammatory process of the left eye, a houseworker

aged 22 years showed the following conditions: partial drooping of the upper lid, which was swollen especially in its external third and was slightly red; lower lid normal (but from the palpebral fissure came a mucopurulent secretion). The corresponding palpebral conjunctiva was thick and granular with small elevated nodules some of which were pink, others gray, and still others whitish-gray. Among the nodules seen were some ulcers and a dense fibrinoid secretion. The bulbar conjunctiva was slightly hyperemic. Histologic, bacteriologic, and biologic researches demonstrated that the conjunctival disease was of tuberculous origin. (Bibliography, 24 figures.)

M. Lombardo.

6

CORNEA AND SCLERA

Amenabar Prieto, M. **The status of corneal transplantation and personal experiences with it.** Arch. de Oft. de Buenos Aires, 1937, v. 12, Aug., p. 520.

The Castroviejo method of transplantation is considered by the writer the most promising, after some sixty transplantations in rabbits and five attempts in human beings. A report on rabbit eyes, sectioned in order to study the hitherto neglected process of cicatrization, is reserved for later publication. The five human cases have been observed from eight to ten months. All the transplants have been retained, none entirely transparent, but none entirely opaque. Vision has improved in all. All the cases had unilateral leucomata. The author believes however that the operation should be reserved for patients with bilateral leucomata, in whom even a slight improvement in the vision of one eye is an important advantage. The author uses only two vertical and two horizontal intracorneal sutures, instead of the more numerous sutures Castroviejo employs to keep the graft in place; and two fixation sutures in the two vertical recti, instead of a blepharostat, to keep the lids away and immobilize the globe during the operation.

M. Davidson.

Bietti, Giambattista. **Bullous keratitis as a postoperative complication after cataract extraction.** Boll. d'Ocul., 1937, v. 16, Aug., pp. 793-807. (See Section 9, Crystalline lens.)

Bonnet, P., and Bussy, J. **Diffuse infiltration of the cornea and conjunctiva by cholesterin crystals.** Bull. Soc. d'Opht. de Paris, 1937, Jan., pp. 53-55.

This occurred in a girl of seventeen years. Crystals were found in all layers of the conjunctiva and cornea, more or less equally spaced, but with a tendency to clump at the bifurcation of the bulbar conjunctival vessels; and in the tarsal conjunctiva they accumulated in regularly spaced points. Blood cholesterin was 85 percent above normal. There were marked evidences of an endocrine dyscrasia. The eyes were otherwise normal.

Harmon Brunner.

Busacca, Archimede. **Introduction of an ivory shell into the anterior chamber in keratoplasty for a large adherent leucoma.** Klin. M. f. Augenh., 1937, v. 99, Oct., p. 472.

The author describes the surgical procedure by which he introduced an ivory shell into the anterior chamber. He hopes this will aid him in performing a very large keratoplasty which he plans to do after a number of months have elapsed. After a severe reaction in the first few weeks the eye became quiet and seemed to tolerate the ivory.

F. Herbert Haessler.

Castellanos, Agustin. **A contribution to the pathologic anatomy of infantile xerophthalmia.** Rev. Cubana Oto-Neuro-Oft., 1937, v. 6, July-Aug., p. 65.

A rare opportunity of studying histologically a case of xerophthalmia before bacterial invasion had taken place leads the writer to the following conclusions: The lesions are essentially trophic. There is an epithelial hyperplasia with slight edema of Bowman's membrane and the subjacent substantia propria near the limbus, and an atrophy of the central corneal epithelium with evident keratinization and disintegration of Bowman's membrane but without leucocytic infiltration or vascularization. (Illustrated.)

M. Davidson.

Delille, O., and Pallett. **Trabeculated formation attached to the posterior surface of the cornea.** Bull. Soc. d'Opht. de Paris, 1937, Jan., pp. 23-30.

For fifteen years the authors had observed the growth of a meshwork on the posterior surface of the cornea of a luetic patient. They record extensions from the main trunk with anastomoses. A vessel from the corneal stroma was observed to penetrate the structure at one point. During this time no portion had absorbed and new branches had developed. From the dichotomous branching, regular tubular form, and lack of fluorescence with the Birch-Hirschfeld lamp, the authors suggest a similarity to the formation of fetal vessels; and of a tissue similar to Descemet's. (3 diagrams, 2 color plates.)

Harmon Brunner.

Dodge, W. M. **Keratoconus.** Amer. Jour. Ophth., 1938, v. 21, Jan., pp. 40-53.

Filatov, V. P. **Additional data on "amelioration of leucoma."** Viestnik Opht., 1937, v. 10, pt. 6, p. 892.

Filatov believes that partial corneal transplantation mobilizes the regenerative forces of the cornea. He performed this operation in eight cases of keratitis of various etiology, with rapid regression of the diseased condition in each case.

Ray K. Daily.

Gasteiger, H., and Liebenam, L. **Multiple dysostosis with special reference to ocular manifestations.** Klin. M. f. Augenh., 1937, v. 99, Oct., p. 433.

The author's patient was one of multiple-ovum twins; the other of which was normal, in an othervise normal family. She was a dwarf with a large coarse-boned head, deformed thorax, lumbar gibbus, large somewhat pendulous belly, and short ill-formed extremities, shown by X ray to result from symmetric deformities in long bones near the joints. The eyes were free from abnormalities except that nebulae of the cornea were grossly discernible. Biomicroscopy resolved the nebulae into innumerable punctate opacities uniformly distributed in all strata of the corneal stroma and Bowman's membrane. Here and there were larger grayish opacities consisting of confluent points. Epithelium and endothelium were normal. The differential diagnosis of the general nosologic entity is discussed at length.

F. Herbert Haessler.

Grolman, G. von. **Keratoconus and trachoma.** Arch. de Oft. de Buenos Aires, 1937, v. 12, Sept., p. 572.

Attention is called to the corneal thinning at the site of the pannus in trachoma, as seen with the slitlamp. It is due to absorption of the anterior layers of the cornea, rather than of the posterior layers. It is therefore not a true, but a simulated keratoconus, and not an ectasia. Three cases are reported and illustrated.

M. Davidson.

Kolenko, A. V. **Autohemotherapy of corneal ulcers.** Viestnik Opht., 1937, v. 10, pt. 6, p. 820.

A detailed report of an experimental study on rabbits. Intracorneal injections of an emulsion of staphylococcus aureus were used for the production of experimental corneal ulcers. This method permits exact dosage, does away with inflammatory phenomena of adjacent tissues, always produces an ulcer, and the ulcer has less of a tendency to spontaneous recovery than ulcers produced by injections of smallpox vaccine. Subcutaneous autohemotherapy shortens the course of the affection by 8.1 per cent. Local autohemotherapy has the same effect but has no advantage over subcutaneous injection. Two preliminary subcutaneous injections did not prevent the development of the ulcer, but subsequent therapy shortened the course of the disease by 37.9 per cent. Preliminary subconjunctival injections, also, did not prevent the development of the ulcer, but subsequent general autohemotherapy shortened the course of the disease by 81 percent. The blood picture under the influence of this therapy is inconstant. Autohemotherapy appears to be a good additional agent in ulcer therapy. It requires individual variation in dosage and in intervals between injections, because apparently some yet not understood constitutional factor plays an important part in its action.

Ray K. Daily.

Kopziovskaja, P. C. **Vital microscopy of the corneal nerves in herpetic keratitis.** Viestnik Opht., 1937, v. 11, pt. 1, p. 64.

The objective of this experimental study on rabbits was to demonstrate the condition of the corneal nerves in herpetic keratitis. Experimental herpetic keratitis was produced by corneal applications of herpes virus. Vital staining was obtained by instillation of one percent methylene blue. A few drops of milk were introduced into the anterior chamber, after withdrawal of the aqueous, to provide a white background. "Ultropak" illumination was used. Without exception the nerves were edematous, giving the impression of swelling and division into fibers. In experimental traumatic keratitis these changes were absent. Ray K. Daily.

Lerner, V. P. **Autohemotherapy in trachomatous pannus.** Viestnik Opht., 1937, v. 10, pt. 6, p. 841.

Of 38 cases 24 were treated exclusively by autohemotherapy, and in twelve this form of therapy was combined with local treatment. The results indicate that in old trachoma with cicatricial corneal changes autohemotherapy is ineffective. In corneal infiltrations and ulcers the combined treatment serves well, and occasionally autohemotherapy alone is effective.

Ray K. Daily.

Levitt, J. M. **Chronic edema of the cornea.** Arch. of Ophth., 1937, v. 18, Nov., pp. 813-820.

A man aged 30 years presented unilateral edema of the cornea, unassociated with trauma, ocular inflammation, infection, hypertension, or any other apparent local or general disease, with the exception of definite hypercholesteremia. Corneal sensation was undisturbed. Apparently there is a primary disturbance of the endothelium with secondary edema of the remainder of the cornea. It is thought to be a nutritional or neurotrophic disturbance, but the basic etiology is unknown. Treatment was unsatisfactory.

J. Hewitt Judd.

Malbran, Jorge. **Biomicroscopy of keratoconus.** Arch. de Oft. de Buenos Aires, 1937, v. 12, Aug., p. 489.

In studying keratoconus with the aid of a contact glass of sufficient radius of curvature to exert pressure on the apex of the cone, the author finds that the keratoconus fissure lines, which Vogt describes as generally and invariably having a vertical disposition, assume a concentric arrangement. The fissure lines have been observed even in the very incipient cases. (Illustrated.)

M. Davidson.

Neimark, I. E. **Keratitis of dental origin.** Viestnik Opht., 1937, v. 10, pt. 6, p. 893.

A report of a case of chronic keratitis with a purulent infiltrate which promptly cleared up after extraction of infected teeth. Ray K. Daily.

Nitzulescu, J., and Traindaf, E. **Treatment of herpetic keratitis with vitamin B.** Brit. Jour. Ophth., 1937, v. 21, Dec., pp. 654-658.

Two cases are presented as having been definitely benefited by treatment with vitamin B. While the two cases are considered insufficient for drawing definite conclusions, they lend encouragement to further use of the treatment in such conditions of the cornea. (Bibliography.) D. F. Harbridge.

Osterberg, G. **Microscopic pathology of Mooren's ulcer of the cornea (rodent ulcer).** Det oftalmologiske Selskab i Köbenhavn's Forhandlinger, 1936-1937, pp. 15-18. In Hospitalstidende, 1937, Dec. 21.

Histologic examination of the eye in a case of rodent ulcer revealed marked changes in the region of the sclerocorneal junction, with involvement of the iris and the ciliary body as well. The blood vessels seemed particulary affected. In the ulcer itself they had a radial arrangement, and showed a tendency to invade healthy corneal tissue. The causation of rodent ulcer of the cornea would seem to lie in changes in the vessels at the sclerocorneal junction.

D. L. Tilderquist.

Russo, A. **Primary adiposis of the cornea.** Rassegna Ital. d'Ottal., 1937, v. 6, July-Aug., p. 413.

Russo gives an excellent reviw of the work of various writers upon the subject of fatty changes in the cornea. He then relates in minute detail the history and examination of a 21-year-old girl who presented a unilateral annular primary adiposis of the cornea. Following a discussion of etiology and pathogenesis, he concludes that one must admit not only an altered fat metabolism but a determining local cause. Histologic study of a trephined bit of cornea demonstrated a focus of lymphocytic infiltration, showing the cornea to be the seat of a chronic inflammatory process, especially between the epithelium and Bowman's membrane. Fatty droplets were abundant. The author calls attention, especially, to the efficacy of local roentgentherapy. (7 figures, 3 colored.) Eugene M. Blake.

Sabata, J. **Electrolysis of corneal ulcers.** Ceskoslovenska Ofth., 1937, v. 3, no. 2, pp. 97-100.

In 1935 electrolysis was used on eight consecutive cases of corneal ulcer. From the results obtained it is impossible to decide whether electrolysis is better than cauterization, but at any rate it is fully as good. Perhaps in case of tiny ulcers a clearer scar is secured more easily by electrolysis than by the small glowing tip of the galvanocautery. Georgiana D. Theobald.

Sanctis, G. E. de. **Observations on the etiology of keratoconus.** Ann. di Ottal., 1937, v. 65, April, p. 279.

The author reports five cases of keratoconus, in three of which roentgenograms showed enlargement of the sella turcica greater than normal, with a deformity of its profile. He calls attention to possible dysfunction of the hypophysis. Where no other cause is discovered he concludes that disturbance of the pituitary hormone may be the sole factor in the corneal changes. (3 figures, bibliography.)

Park Lewis.

Sommer. **Krukenberg pigment spindle and pigment ring of the cornea.** Klin. M. f. Augenh., 1937, v. 99, Oct., p. 648.

The eyes of three patients are briefly described. The first had a Krukenberg spindle in both of his emmetropic eyes, with such massive mobilization of pigment that a peripheral pigment ring developed on the posterior corneal surface. In the second patient, pigment spindles were associated with bilateral cataract in eyes with 5 to 6 D. of myopia. In the third, Krukenberg spindles were noted in slightly hyperopic eyes afflicted with chronic glaucoma. The questions of development of the pigment spindles and their diagnostic and prognostic significance are considered, without conclusions.

F. Herbert Haessler.

Stastnik, Emanuel. **An attempt to modify Denig's plastic operation for trachoma pannus; subconjunctival implantation of catgut.** Ceskoslovenska Ofth., 1937, v. 3, no. 2, pp. 95-97.

The author makes circumcorneal incisions at 9, 12, and 3 o'clock; buries one or two strands of no. 3 catgut, and closes the incisions with catgut. The immediate anemia is followed in two or three days by a hyperemia which may be likened to that following subconjunctival injections of oxycyanide. The cornea gains luster, the infiltrates heal, and the vascularity becomes less. The operation was done on four eyes in three patients. The author reports this only as an experiment to be tried further. Since these operations he has read that Melik-Musjan (Zentralblatt für die gesamte Ophthalmologie, v. 34, p. 602) has been performing a similar operation by stitching catgut around the pannus area of the cornea.

Georgiana D. Theobald.

Urrets Zavalia, A., and Obregon Oliva, R. **Glassy striae in the anterior chamber.** Arch. de Oft. de Buenos Aires, 1937, v. 12, Oct., p. 626.

The case reported, in a male of 48 years, with a history and other evidence of interstitial keratitis in adolescence, presented in one eye the rare free striae and in the other the more common striae lining Descemet's membrane. (Illustrated.)

M. Davidson.

Vanysek, Jan. **Keratomalacia.** Ceskoslovenska Ofth., 1937, v. 3, no. 2, pp. 131-139.

All cases studied in the Brno Clinic were due to deficiency of vitamin A. An infection always preceded the eye trouble, which (in the author's opinion), accompanied by lack of vitamin A, hastened the development of the xerophthalmia. In all children in whom thrombocytopenia was found, improvement was rapid after giving carotine. At the same time their nutritional anemia grew better. The therapy combining the carotine with their food was adapted to their age. They never refused it and it satisfied them. The frequency of keratomalacia cases is be-

lieved largely confined to the very poor, whose standards of living are necessarily low. Georgiana D. Theobald.

Wright, R. E. **Fatty degeneration of the cornea (neutral and lipoid).** Arch. of Ophth., 1937, v. 18, Nov., pp. 697-706.

This report is a continuation of the paper entitled "Degeneration of the cornea, calcareous(?) and fatty" (see Amer. Jour. Ophth., 1936, v. 19, p. 939). Additional data were obtained on one of the cases through histopathologic examination of a disc of the cornea removed for keratoplasty. Crystalline plates of cholesterol were found in the substantia propria surrounded by fine globules of neutral fat. The deeper layers showed perivascular cellular infiltration. The abundance of cholesterol in the cornea and the hypercholesteremia suggest a metabolic derangement associated with defective lipoid metabolism. The author describes four varieties of fatty degeneration of the cornea. J. Hewitt Judd.

7

UVEAL TRACT, SYMPATHETIC DISEASE, AND AQUEOUS HUMOR

Knapp, Arnold. **Formation of preretinal connective tissue in the vitreous in acute choroiditis.** Arch. of Ophth., 1937, v. 18, Oct., pp. 558-560; also Trans. Amer. Ophth. Soc., 1937, v. 35.

This condition was found in three males, aged 22, 39, and 17 years respectively. It is usually associated with a large choroidal patch which is not connected with the opacity in the vitreous. The vitreous is clear except for this opacity, which is situated just in front of the retina and usually in the macular region. The opacity adheres to the retina and is irregularly branching, whitish, and of varying thickness in the center, fading out at the periphery. It appears to be anchored to the internal limiting membrane, always covers the retinal blood vessels, and is free from new-formed capillaries. The opacity tends to become thinner, although it never disappears, and final vision is often surprisingly good. The tissue does not exert any traction or cause separation of the retina. J. Hewitt Judd.

Lamb, H. D. **Chronic cellular infiltration of the uvea in septic endophthalmitis of ectogenous origin.** Amer. Jour. Ophth., 1938, v. 21, Feb., pp. 137-144.

Solanes, M. P. **Gonioscopy of the surgical colobomas of the iris.** Anales de la Soc. Mexicana de Oft., 1937, v. 12, July-Sept., pp. 1-16.

The Spanish original of the paper which appeared in the American Journal of Ophthalmology (1937, v. 20, p. 731).

White, B. V., Jr., and Fulton, M. N. **A rare pupillary defect.** Jour. of Heredity, 1937, v. 28, 177-179.

The authors present a case of rare pupillary defect (egg-shaped pupils) in identical twins, inherited apparently from the mother. The characteristics of the pupils were (1) dilatation, (2) irregularity, and (3) reaction to constricting stimuli only in the superior temporal and the inferior nasal quadrants. The siblings of the twins did not show this defect. (2 photographs, 2 diagrams, 8 references.)

Ralph W. Danielson.

8

GLAUCOMA AND OCULAR TENSION

Bauer, C. **Heine's cyclodialysis in the treatment of glaucoma.** Anales de la Soc. Mexicana de Oft., 1937, v. 11, Jan.-March, p. 169.

Approval, and a brief description, of the operation.

Hörven, Eivind. **Exfoliation of the superficial layer of the lens capsule (Vogt) and its relation to glaucoma simplex.** Brit. Jour. Ophth., 1937, v. 21, Dec., pp. 625-637.

The author cites Vogt's first description of the disease in 1925, with some forty or fifty papers published on the same subject since that time. Flakes of the pupillary border, a central disc and peripheral band on the lens capsule, and changes in the zonule of Zinn are described as forming the clinical picture of the exfoliation. As to the author's findings, of 150 patients operated on for glaucoma simplex, 85 percent were found with exfoliation. Among 67 aged patients, without signs of glaucoma, exfoliation was found in two instances. It is concluded that senile exfoliation of the lens capsule must in some way be the cause of glaucoma simplex, although the differences found are not easily explained. (Illustrations, tables.) D. F. Harbridge.

Lehrfeld, L., and Reber, J. **Glaucoma at the Wills Hospital, 1926-1935.** Arch. of Ophth., 1937, v. 18, Nov., pp. 712-738.

This report is based on the examination of records of 1,876 patients with glaucoma seen during this period. There were 413 cases of secondary glaucoma, and in 34 percent of these the condition ended in serious visual impairment. Trauma and syphilis were the two most prominent etiologic factors. There were 28 cases of congenital and twenty cases of juvenile glaucoma. Of 1,415 cases of primary glaucoma 27.7 percent were of the congestive type and 72.3 percent were of the non-congestive type. These are analyzed on the basis of age, sex, refractive error, race, previous treatment, duration of symptoms, and other factors. The results of treatment for the various types of glaucoma are presented from the standpoint of reduction of intraocular tension during the period of observation, ranging from two to ten years. The Elliot trephine operation appears to be the most efficient form of treatment. The necessity for earlier diagnosis is stressed since it was found that 784 eyes had vision below 6/60 when the patients first presented themselves for treatment. J. Hewitt Judd.

Marucci, L. **Juvenile glaucoma with angiomatosis retinae.** Arch. di Ottal., 1937, v. 44, May-June, p. 163. (See Section 10, Retina and vitreous.)

Reaser, E. F. **Psychosis associated with glaucoma simplex.** Jour. Nervous and Mental Dis., 1936, v. 84, Dec., p. 663.

The patient was a white male 32 years old with a history of syphilis, and with a depressive type of insanity. There was a history of progressive loss of vision with severe headaches and dilated pupils. No mention is made of the amount of vision or of the state of the fields. Tension was 70 mm., with excavation of both discs. Both eyes were operated upon, and after this the patient could read the newspaper (in good light). His mental condition returned to normal. M. E. Marcove.

Stough, J. T. **Intraocular neurofibroma.** Arch. of Ophth., 1937, v. 18, Oct., pp. 540-546.

An eye removed from a youth aged 21 years, for secondary glaucoma, was found to contain a perineural fibroblastoma presenting the characteristic

regular arrangement or palisading of the cells, the presence of reticulin fibers, cystic changes, and the absence of pigment and of mitotic figures. Cases previously reported in the literature are reviewed. J. Hewitt Judd.

Thomas, F. C. **An early warning of impending glaucoma?** Kentucky Med. Jour., 1936, v. 34, Oct., p. 440.

The author discusses the relationship between a tendency toward myopia and glaucoma. In patients in middle life or early old age who showed a myopic tendency there was also a tendency toward glaucoma. He believes that all of these patients should be treated as potential glaucoma patients, and should be given miotics. He has observed 39 cases varying in age from 54 to 83 years, and has felt that these cases were glaucomatous although they showed only a myopic tendency in later years.

M. E. Marcove.

9

CRYSTALLINE LENS

Barkan, H., and Bettman, J. W. **The occurrence of so-called dinitrophenol cataracts without ingestion of dinitrophenol.** Amer. Jour. Ophth., 1938, v. 21, Feb., pp. 165-168.

Campbell, D. R. **Recent observations on biochemistry of the lens.** Brit. Med. Jour., 1936, Dec. 5, p. 1133.

In this paper the author reviews the more important observations on biochemistry of the lens, chiefly the work of the past three years. Disturbance of carbohydrate metabolism, especially increase of lactose, has played a significant part. Dogs fed upon a diet containing 70 percent lactose developed mature cataracts in ten weeks, while with lower percentages of lactose the cataracts developed more slowly. Diets containing 70 percent of other carbohydrates had no effect on the lens. Calcium gluconate had no appreciable effect on the lens in those cases given lactose. The effects of vitamin deficiency on the lens have been very variable. According to some authors deficiency of vitamin A has been the cause of cataract in six months, probably due to disturbance of calcium-phosphorus balance. Some American authors have reported an incidence of one hundred percent cataract development with deficiency in vitamin B_2. This has not been substantiated by English authors. The effect of vitamin C has been studied by many authors, but only two state that the lens became cloudy with lack of this vitamin. There appears however to be a definite relationship between vitamin C and oxidation of cystine, the vitamin C evidently acting as a catalyzer. The effect of toxic substances upon the development of cataract has appeared in a new light since it was shown that dinitrophenol and naphthalene are closely related chemically. M. E. Marcove.

Clapp, C. A. **Surgical intervention for cataract; from the preoperative and postoperative standpoints.** Arch. of Ophth., 1937, v. 18, Nov., pp. 827-837.

In this review are considered the questions of the survey of the case prior to operation, the choice of the operation, the advantages and disadvantages of preliminary iridectomy, and the postoperative complications of glaucoma, endophthalmitis phaco-anaphylactica, sympathetic ophthalmia, postoperative hemorrhage, purulent and nonpurulent inflammations, detachment of the retina and choroid, and postoperative delirium.

J. Hewitt Judd.

Knobloch, Rudolf. **Bilateral anterior lenticonus.** Ceskoslovenska Ofth., 1937, v. 3, no. 1, pp. 67-69.

The author describes anterior lenticonus which developed in both eyes of a 20-year-old cinema operator. It produced a central lens myopia of 7 D. in an emmetropic periphery. Slitlamp showed only that the anterior capsule was arched, but not the limits of the surface between the detached zone and the cortical zone as in posterior lenticonus. The author gives illustrations in color of the slitlamp findings.

Georgiana D. Theobald.

Oneto, J. A., Gallino, J. A., and Natale, A. **Rapid development of bilateral cataracts from dinitrophenol treatment of obesity.** Arch. de Oft. de Buenos Aires, 1937, v. 12, Nov., p. 731.

The literature is reviewed and a case is reported in a young woman of 25 years, from use of nitral for forty days, followed by a two-month interval and then resumption for three weeks. The bilateral opacity was complete in two weeks. There was a fine pigmented powder on the anterior capsule.

M. Davidson.

10

RETINA AND VITREOUS

Arruga, H. **Treatment of detachment of the retina.** Arch. of Ophth., 1937, v. 18, Oct., pp. 501-509.

The various factors in surgical technique and postoperative treatment which make for a good result are presented, and the prognosis and pathogenesis of retinal separation are discussed. Variations in technique are necessary to meet all the conditions found in atypical cases. The importance of the ophthalmoscopic examination is stressed, as a good localization allows repair of the hole with a smaller area of cauterization. In using local anesthesia, the injection should be made into Tenon's capsule and not subconjunctivally.

J. Hewitt Judd.

Bietti, Giambattista. **Familial occurrence of retinitis punctata albescens associated with other anomalies.** Klin. M. f. Augenh., 1937, v. 99, Dec., p. 737.

Retinitis punctata albescens is a retinal change which has been reported fifty times. The author describes the eyes of two brothers, aged 31 and 26 years, with retinitis punctata albescens; and of four blood relatives who exhibited changes which may be related to the same retinal disorder. The older of the brothers had hemeralopia, which had appeared late. In the younger, it had not developed. Both had dyschromatopsia, marked atrophy of the posterior iris layer at the pupillary margin, and crystalline corneal inclusions near the margin. Each had peripheral pigment disturbances in the retina, and the older one had also pigmentation of the macula. The spots of retinitis punctata albescens were polar, including the macula in the older patient, and were very pale yellow and glistening. Some were round and others angular. They occupied not only the deepest retinal stratum, as is usually found, but in smaller number the middle and inner layers. A few even overlay the vessels. The older patient had a hypercholesterinemia. The father and three of his sisters were also examined. Among members of the family, four had scintillating vitreous, four albinism, and two dyschromatopsia. In two other unrelated patients, many similar manifestations were observed. It is tentatively suggested that retinitis punctata albescens, like other forms

with hemeralopia, may be a lipoid dystrophy. F. Herbert Haessler.

Brown, T. H. **Retinochoroiditis radiata.** Brit. Jour. Ophth., 1937, v. 21. Dec., pp. 645-648.

A unique feature of this case, making it dissimilar to all others reported in the literature, is the localization of all patches of choroidal atrophy along the course of the retinal veins, even to the point of bifurcating along with these veins. It was definitely established that the retinal veins were responsible for the distribution of the type of atrophy reported; hence the name suggested for the disease. (Illustration.) D. F. Harbridge.

Dunnington, J. H., and Macnie, J. P. **Detachment of the retina, operative results in one hundred and sixty-four cases.** Arch. of Ophth., 1937, v. 18, Oct., pp. 532-539; also Trans. Amer. Ophth. Soc., 1937, v. 35.

In this series, 67 percent were males and 33 percent were females; the youngest patient was 6 and the oldest 79 years. The history of trauma was obtained in 17 percent, and in another 13 percent accident was considered a contributory factor. The cases are analyzed as to refractive error, muscular imbalance, intraocular tension, and changes in the crystalline lens and the visual fields. Under relation of the various factors to the operative results, the authors consider the time of onset, site extent and type of the detachment, and the presence of holes. The operative method used is discussed and described. The condition was cured in 52.1 percent, improved in 9.2 percent, and not helped in 49.7 percent. Factors contributing to an unsuccessful result were advanced age, high myopia, aphakia, hypotony, extensive detachment, multiple or large tears, and changes in the choroid and retina. When a widespread treatment of the affected area was used, cases in which no retinal holes were found responded to operation as well as those presenting holes. J. Hewitt Judd.

Feldman, J. B. **An instrument for qualitative study of dark adaptation.** Arch. of Ophth., 1937, v. 18, Nov., pp. 821-826.

An instrument for rapid qualitative check on the light threshold is described and the method of its use outlined. The time at which the light stimulus is first noticed by the patient is the only variable in this test. A period up to five minutes is considered a normal interval for reaching the light threshold. One hundred and sixteen patients were examined, about 40 percent of whom showed dysaptation. In the group with a normal light threshold, several were found who showed a pathologic condition in one or both eyes. Those with a pathologic light threshold associated with a pathologic condition are given in a table. The rest of the subjects with a dysaptation are classed as persons in whom failure of regeneration of the visual purple is due to vitamin-A deficiency. J. Hewitt Judd.

Franta, Jiri. Preretinal hemorrhage. Ceskoslovenska Ofth., 1937, v. 3, no. 1, pp. 71-74.

Contrary to the general opinion in the literature that preretinal hemorrhages usually have a favorable prognosis, this author reports two cases with poor result. In one patient, after a year and a half, vision remained counting fingers at 1.5 to 2 m. In a second patient it was 5/10 to 5/7.5, but a small central scotoma remained and

interfered with work. In both cases irreparable changes appeared in the retinal vessels. The prognosis in preretinal hemorrhage should be made with caution.

Georgiana D. Theobald.

Jancke, G. **Retinal congestion as an expression of participation of the retinal vessels in failure of the right heart.** Klin. M. f. Augenh., 1937, v. 99, Dec., p. 756.

In an earlier communication, the author had pointed out that the typical ophthalmoscopic picture called "cyanosis retinae" which is considered pathognomonic of polycythemia is also seen occasionally in failure of the right heart. To confirm this opinion, he examined the eye grounds of every patient with pulmonary emphysema and failure of the right side of the heart that appeared on the medical service of his hospital. In less than six months he found three patients in whom retinal congestion was secondary to failure of the right heart.

F. Herbert Haessler.

Krause, A. C.. **Chemistry of the retina. 4. The bacillary layer.** Arch. of Ophth., 1937, v. 18, Nov., pp. 807-812.

The author describes his method of extracting and analyzing bovine visual purple. It is found that the visual purple is a lipoprotein composed of a protein conjugated with a golden yellow lipid having the properties of a carotenoid derivative, which comes wholly from the bacillary layer. It is not certain whether or not the lipoprotein contains lecithin and cholesterol. Exposure of the visual purple to light shows that it liberates the golden yellow lipid, which on further exposure to light breaks down into a colorless noncarotenoid substance.

J. Hewitt Judd.

Lijo Pavia, J. **Trabeculation of the vitreous in one eye and deposits in the hyaloid membrane of each eye.** Arch. de Oft. de Buenos Aires, 1937, v. 12, Nov., p. 756.

Observation in a luetic, of a trabeculum traversing the vitreous anteroposteriorly in two planes, forming a cone, in one eye, and vitreous opacities adherent to the internal limiting membrane in both eyes, all of a waxy color, and considered as formed entirely of vitreous elements, argues in favor of the laminated arrangement of the vitreous framework, as Fuchs taught.

M. Davidson.

Lijo Pavia, J., and Tartari, R. A. **Multiple circumscribed detachment.** Arch. de Oft. de Buenos Aires, 1937, v. 12, Nov., p. 778. (See Amer. Jour. Ophth., 1938, v. 21, March, p. 336.)

Mann, I., and Macrae, A. **Congenital vascular veils in the vitreous.** Brit. Jour. Ophth., 1938, v. 22, Jan., pp. 1-10.

Three cases, two in brothers, are presented. Evidence supports the theory that congenital retinal fold is due to an abnormality of development of the vitreous. It is pointed out that special examination should be given to (1) the nature and origin of the tissue in the veil, and (2) the nature and origin of the vessels in the veil. In the first instance, it is felt by the author that the veil is in the nature of a vitreous condensation and that, in the beginning, it had contact with the inner layer of the optic cup. In the second instance, three possibilities are presented, the point of difficulty of acceptance being due to the fact that the vessels are without doubt retinal in part of their course and vitreous in another. The cases throw light on the subject without furnishing positive evidence as to initial cause

and exact mechanism involved. (6 figures, reference.) D. F. Harbridge.

Marucci, L. **Juvenile glaucoma with angiomatosis retinae.** Arch. di Ottal., 1937, v. 44, May-June, p. 163.

A vascular anomaly in both eyes in the region of the optic disc was associated with bilateral glaucoma and uveal angiomatosis. H. D. Scarney.

Miranda, A. G. **On myelinated retinal fibers.** Ann. d'Ocul., 1937, v. 174, Nov., pp. 744-750.

A case of extensive myelination of the retinal fibers is reported in a man of twenty years. In one eye almost all of the fibers were myelinated except for the papillomacular bundle. The white fibers extended in an arc above and below the macular bundle. This eye was 8 D. myopic, the other eye being normal. The author cites works in which Berg and others point out that high myopia is very frequently found in eyes containing myelinated fibers. John C. Long.

Rosengren, B. **Detachment of the retina treated with diathermy and injection of air into the vitreous.** Det oftalmologiske Selskab i Köbenhavn's Forhandlinger, 1936-1937, pp. 35-38. In Hospitalstidende, 1937, Dec. 21.

It is assumed that one reason for recurrence of the detachment after operation is failure of the retina to stay in close approximation to the scleral wall during the process of healing. To avoid this difficulty, a fine needle connected with a syringe containing sterile air is inserted into the vitreous cavity through the posterior border of the ciliary body after coagulation of the sclera is complete. The perforation for drainage of the subretinal fluid is then done, after which 1 to 1.5 c.c. of air is injected. This raises the tension of the globe to normal at once. The patient is placed in bed in such a position that the air is adjacent to the lesion. Eight eyes have been treated by this method, with satisfactory results in six.

D. L. Tilderquist.

Verhoeff, F. H., and Grossman, H. P. **Pathogenesis of disciform degeneration of the macula.** Arch. of Ophth., 1937, v. 18, Oct., pp. 561-585; also Trans. Amer. Ophth. Soc., 1937, v. 35.

An analysis was made of 84 cases (129 eyes) reported in the literature, of which thirteen were examined microscopically. This revealed that the pathogenesis of senile disciform degeneration of the macula had not hitherto been determined. The clinical and ophthalmoscopic observations in three cases are described in detail and illustrated by photomicrographs and a colored plate. In two of these cases it was found that hemorrhagic extravasate can occur between the pigment epithelium and Bruch's membrane, can undergo organization, and can produce an ophthalmoscopic picture typical of senile disciform degeneration of the macula. In the third case, microscopic examination revealed the pigment epithelium lifted up in the form of a large vesicle by serous exudate. It is thought that such a serous exudate may be the cause of juvenile disciform degeneration, and that so-called serous retinitis may have a similar origin. Extravasation of blood or serum beneath the pigment epithelium is due to some disturbance of the choriocapillaris, probably a localized angiosclerosis. The frequent association of the condition with circinate retinitis may be due to the fact that each occurs in specially differentiated vascular beds. It is possible, however, in some cases at least, that circinate retinitis causes disciform

degeneration by producing hemorrhage or serous exudate from the choriocapillaris. (Bibliography.)

J. Hewitt Judd.

Wagener, H. P. **Clinical interpretation of retinal vascular lesions in hypertension and nephritis.** Pennsylvania Med. Jour., 1937, v. 40, June, p. 705.

The author gives the classification of hypertensive retinal lesions in nephritis, and of retinal lesions associated with primary hypertension and arteriolosclerosis (retinal). Their diagnostic and prognostic significance are discussed. F. M. Crage.

11

OPTIC NERVE AND TOXIC AMBLYOPIAS

Begue, M. **Optic atrophy and stovarsol.** Bull. Soc. d'Opht. de Paris, 1937, Jan., pp. 31-35.

A discussion of the incidence of optic atrophy following the use of stovarsol in the treatment of general paresis. The author reports the treatment of 115 cases of general paresis in which the ocular findings alone were used as a guide for treatment without a single case of optic atrophy. He believes that injury to the nerve could be prevented if treatment were governed by the ocular findings as well as the tests for kidney function.

Harmon Brunner.

Clay, G. E., and Baird, J. M. **An unclassified type of optic neuritis.** Arch. of Ophth., 1937, v. 18, Nov., pp. 777-788; also Trans. Sec. on Ophth., Amer. Med. Assoc., 1937, 88th mtg.

Seven cases are reported in which the condition was diagnosed as an acute infectious optic neuritis. In all cases there was sudden loss of vision with a central scotoma, and in most instances there was prodromal malaise, with slight cold and sore throat antedating the onset from one to two months. There was soreness and pain on movement of the eyeballs, with swelling of the optic disc from 1 to 6 D. Atrophy of the optic nerve occurred early, and was consecutive in type. If vision failed to show improvement early, that is in six weeks, the prognosis was grave. The fundus picture in these cases resembles closely that found in the demyelinating diseases associated with optic neuritis, especially neuromyelitis optica. The acute onset, the swelling of the nerve head, the central scotoma, and the inevitable consecutive atrophy give a picture parallel to that of neuromyelitis optica except that the cord is not involved. In the course of time the disc may take on the picture of a primary atrophy. The treatment in all cases was empirical. (Discussion.)

J. Hewitt Judd.

Espino, L. V. **Familial infantile amaurotic idiocy in Mexico.** Anales de la Soc. Mexicana de Oft., 1937, v. 11, Jan.-March, pp. 179-186.

Description of two cases in Mexican half-breeds, not of Jewish blood (presumably Spanish-Indian).

Goldstein, I., and Wexler, D. **Bilateral atrophy of the optic nerve in periarteritis nodosa.** Arch. of Ophth., 1937, v. 18, Nov., pp. 767-773.

A woman, aged 45 years, had asthmatic attacks of sixteen months' duration. Four months previously biopsy of a muscle had shown periarteritis nodosa. The vision suddenly became poor in both eyes. In each eye the disc was pale and had a greenish tinge, the regular pigmentary pattern of the

choroid had disappeared leaving only a diffuse scattering of granules of pigment, and the retina appeared thin but there were no white lines or streaks. The retinal arteries and veins were constricted. The patient died from bronchial pneumonia. Histologic examination of the eyes showed a typical periarteritis nodosa involving the posterior ciliary arteries and those of the choroid, with destruction of the neuro-epithelial layer, subretinal exudate, and infiltration of the disc and lamina cribrosa. (Photomicrographs.) J. Hewitt Judd.

McKee, S. H., and McNaughton, F. L. **Neuromyelitis optica.** Amer. Jour. Ophth., 1938, v. 21, Feb., pp. 130-135; also Trans. Amer. Ophth. Soc., 1937, v. 35.

Miklos, Andor. **Results with decompression therapy in tabetic optic atrophy.** Graefe's Arch., 1937, v. 138, pt. 3, p. 219.

In addition to energetic antiluetic therapy, it was found advantageous to reduce the tension of the eyeball as recommended by Lauber and Sobański. The findings in seventeen cases of tabetic optic atrophy are tabulated. Pilocarpin 2 per cent instilled two to four times a day was not always sufficient alone to produce pronounced diminution of intraocular tension. Blaskovics' modified form of cyclodialysis was performed on twenty eyes and was always followed by some improvement in vision and field. Not more than six months at most had elapsed from the date of the operation. H. D. Lamb.

12

VISUAL TRACTS AND CENTERS

Bartley, S. H., O'Leary, J., and Bishop, G. H. **Modification by strychnine of response of the optic cortex.** Proc. Soc. Exper. Biology and Med., 1937, v. 36, April, p. 248.

Strychnine serves to differentiate two sequences of potential, one diphasic and the other triphasic. The diphasic process is inferred to be the immediate visual one and its marked increase by strychnine corresponds to the increased functional excitability of the spinal cord and motor cortex under this drug. The triphasic sequence is presumably not the immediate correlate of vision because it is not suppressed by a degree of narcosis which abolishes vision and because the spontaneous activity goes on even after degeneration of the optic nerve. Edna M. Reynolds.

Bishop and O'Leary, **Components of the electrical response of the optic cortex of the rabbit.** Amer. Jour. Physiology, 1936, v. 117, Oct. 1, p. 292.

The rabbit was chosen because the cortex is without fissures. A single maximal stimulus applied to the fibers of the optic nerve results in a response of the optic cortex, of which four components can be differentiated. The first two are diphasic potentials, the third is a slow, surface-negative deflection, the fourth a slow surface-positive deflection. These components, any two of which may be confluent in a given record, are differentiated by their differences of form when separate, by their differential changes under manipulation, and by the fact that they are recorded differently when led from different levels in the vertical stratification of the cortex. M. E. Marcove.

Dahlsgaard-Nielsen, Esther. **Sturge-Weber's disease.** Det oftalmologiske Selskab i Köbenhavn's Forhandlinger,

1936-1937, pp. 3-7. In Hospitalstidende, 1937, Dec. 21.

There are various designations for this rare disease. Angiomatosis encephali et trigemini has been proposed as a proper term. The report concerns a girl, twelve years old, who had suffered from epileptic attacks since her first year. Her mentality was below normal. Objectively she showed a nevus flammeus of the forehead and face on the right side, left-sided facial paralysis, left hemianopsia, changes in blood vessels of the conjunctiva and retina, and scoliosis. Roentgen films revealed marked calcification in the region of the occipital lobes.

D. L. Tilderquist.

Lodberg, C. V. **Failure of vision following hemorrhage.** Det oftalmologiske Selskab i Köbenhavn's Forhandlinger, 1936-1937, pp. 22-27. In Hospitalstidende, 1937, Dec. 21.

Two cases of loss of vision following hemorrhage are reported: A young man had suffered from melena for one week, after which hematemesis occurred. He was deeply anemic with a hemoglobin reading of 18 percent (Sahli). On the eighth day there appeared failure of vision involving especially the right eye. Optic neuritis was demonstrable on the fourteenth day. After two months the left eye recovered entirely, but the right revealed optic atrophy with marked reduction of the field especially in the lower half.

A girl, seventeen years of age, was afflicted with repeated severe menorrhagia. During this she noticed loss of vision affecting mostly the left eye. Hemoglobin was 20 percent. Optic neuritis appeared in both eyes, especially the left, after a period of three weeks. The right eye recovered, but optic atrophy remained in the left, also a field defect in the lower half.

D. L. Tilderquist.

Moller, H. U. **Sturge-Weber's disease.** Det oftalmologiske Selskab i Köbenhavn's Forhandlinger, 1936-1937, pp. 7-10. In Hospitalstidende, 1937, Dec. 21.

The report concerns a girl, aged five years, who first appeared on account of left-sided blindness from glaucoma. On the left there were ptosis and complete oculomotor paresis. Multiple small nevi were present on the face, chin, sternum, arms, and sacral region. The left arm showed flaccid paralysis and some degree of atrophy. Roentgen films revealed no definite calcification, but multiple brain lesions corresponding to the distribution of the nevi were assumed. D. L. Tilderquist.

NEWS ITEMS

Edited by Dr. H. Rommel Hildreth
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News items should reach the Editor by the twelfth of the month

Deaths

Dr. Harry Vanderbilt Würdemann, Seattle, died January 30, 1938, aged 72 years.

Dr. James Lancelot Minor, Cordova, Tenn., died December 3, 1937, aged 83 years.

Dr. William Charles McLaughlin, Providence, R.I., died December 3, 1937, aged 57 years.

Dr. Isadore Goldstein, New York City, died December 23, 1937, aged 59 years.

Prof. Rigobert Possek died in Graz on June 28, 1937.

Prof. Etienne Rollet died in Lyon in June, 1937, aged 75 years.

Dr. Richard Krämer, Vienna, Austria, died November 26, 1937, aged 59 years.

Miscellaneous

The Ukrainian Institute of Experimental Ophthalmology has just completed a 200-bed institution, opened January 1, 1938, to carry on its work. Modern in every respect, the institution is most unique, having 12 research laboratories, a clinical department of 100 beds, isolation wards, subdepartments for biochemistry, morbid anatomy, and so forth.

In the issue of May last of the "Annali de Ophthalmologia," which has just reached this country, is announcement of the Child Welfare Exposition which was held during the past summer in Rome. It comprised four congresses held successively during June, July, August, and September. It was held under the direction of the Fascist Government and included for consideration everything directly or indirectly concerned with the instruction, the development, and care of infants and children.

It was headed by the most eminent scientists in each department. A reduction of railway fares was granted, and other privileges were accorded, such as free access to museums and galleries in the capital. Other congresses were to follow: one on the "Care of infants," one on "Obstetrics and gynecology," and finally an International Congress on Pediatrics.

In the city of Havana, Cuba, there has recently been formed an institute for the protection of vision. The first director of the institute is Dr. Tomás Yanes.

The Cook County Graduate School of Medicine (in affiliation with Cook County Hospital) announces continuous courses in ophthalmology and otolaryngology. Course No. 1 in ophthalmology is an informal course for observation of the routine of examination, diagnosis, and therapy as carried on daily in the clinic, ward, and operating room. The course is available starting the first of every week, except when Course No. 2 is in progress. The second course is a two weeks' intensive clinical and didactic course covering, in condensed form, the present status of the most important phases of ophthalmology, with special emphasis on developments during the past decade.

The course will start on April 18th and October 17th if six doctors are registered two weeks in advance of the starting date. The enrollment will be limited to six doctors, and registrations will be accepted in the order received.

The Eye Department of the University of Chicago is making an extended effort to build up the physiologic chemistry aspects of ophthalmology under the guidance of Dr. A. C. Krause and will welcome graduate students in this special field. The department has two full-time technicians (one a Ph.D.) and has two graduate students, one Dr. Roger Weekers of Liége, Brussels, who is on a C.R.B. Fellowship (C.R.B. Educational Foundation, Inc. established by the Commission for Relief in Belgium).

The tenth special course for postgraduate study in ophthalmology, Vienna, will be given between October 3 and December 7, 1938, under the auspices of the American Medical Association of Vienna at the I. and II. Eye Clinic of the Allgemeines Krankenhaus, Vienna, Austria.

This intensive postgraduate instruction was first originated in Vienna in 1922 as a result of a suggestion by Dr. Edward Jackson of Denver to Prof. E. Fuchs. Prof. J. Meller and Prof. K. Lindner, chiefs of the eye clinics, have again consented to take an active part. The other lectures will be given by Prof. A. Fuchs, the Docents Dr. E. Bachster, Dr. K. Safar, Dr. L. Sallmann, Dr. F. Fischer, Dr. H. Rieger and Assistants Dr. J. Bock, Dr. W. Kreibig, Dr. F. Ramach, Dr. F. Subal and Dr. E. Prebburger. Professors of other departments will deliver lectures in their respective subjects: Prof. A. Schuller on roentgen rays, Prof. O. Hirsch on the hypophysis and sinuses; Prof. J. Bauer on

endocrine disturbances; Prof. K. Kofler on the modified West operation. Applications with a certified check for $100 should be sent only to Prof. A. Fuchs, Vienna, VIII., Skodagasse 13. Applications are accepted in order of priority. The application fee will be returned if the application is cancelled before September 15.

Karl Liebrecht donated a memorial fund for Wilhelm Uhthoff to be administered by the Deutsche Ophthalmologisch Gesellschaft. The interest may be used at the discretion of the president of the council for prizes, aids to research, or any other project of the society.

The Committee on Statistics of the Blind, jointly sponsored by the American Foundation for the Blind and the National Society for the Prevention of Blindness, was appointed in 1929 to study the problems of statistics of blindness and the blind and make recommendations for the improvement of such statistical data. The present "Classification" is the outgrowth of six years of experimental work, during which time it has been tried out on more than 7,000 cases, drawn from various parts of the country and from differing age groups. In all the stages of the gradual development of this scheme, the committee has been so fortunate as to have the constant advice and assistance of ophthalmologists, some of whom acted as general advisers while others reported groups of their own cases to be classified. Minor revisions have been made from time to time as the need arose, and the "Classification," having proved its practicability by use, is now recommended for adoption by state and private agencies throughout the country which are dealing with the blind.

The Committee on Statistics of the Blind has designed a record form for Physician's Report on Eye Examination. Copies of the record form and its "Classification" are obtainable from the office of the Secretary, 15 West 16th Street, New York City.

The following abstract is prepared from a report by Surgeon C. E. Rice, U. S. Public Health Service, Consultant on Blindness to the Social Security Board. The report is to the Committee on General Activities of the Council of the American Academy of Ophthalmology and Otolaryngology, October 13, 1937.

Thirty-six states are now coöperating with the Social Security Board in granting financial assistance to the needy blind. The Board has set up a definition of blindness which is placed before the separate states. The definition is not obligatory on any state and is proposed by the Board in the hope that some uniformity may result. It is based on the definition of economic blindness proposed by the American Medical Association in 1934, and differs but little from that definition. It reads as follows: "In general, central visual acuity of 20/200 or less in the better eye with proper correction has been considered as economic blindness. An individual with central visual acuity of more than 20/200 in the better eye with proper correction is usually not considered blind, unless there is a field defect in which the peripheral field has contracted to such an extent that the widest diameter of the remaining visual field subtends an angular distance no greater than 20 degrees." The state law in most cases is so worded as to give to the official State Board the power to define blindness in "ophthalmic units" through rule and regulation.

In the 36 states listed as now coöperating with the Social Security Board in the program of aid to the blind, 30 states have the definite statutory requirement that these examinations must be made by a physician skilled in diseases of the eye or an ophthalmologist or an oculist. Various terminology is used.

As to the methods of choosing the examiners for designation, various schemes have been used. Four states stated definitely that the ophthalmologists were chosen by the State Medical Society. One stated that the State Health Department chose the examiners. Another stated that all those listed in the Directory of the A.M.A. as practicing ophthalmology or eye, ear, nose and throat, were designated. In three or four states, committees of ophthalmologists were appointed by the state agencies administering blind assistance and these committees in turn chose the examiners throughout their respective states. The almost universal tendency has been to use the Directory of the A.M.A. and to designate all those who indicate the proper specialty. Only one state has limited examinations to ophthalmologists certified by the American Board of Ophthalmology. That state is Maryland. Many of the states have expressed the wish that ophthalmologists were licensed as such. The licensing of the specialties possibly has not been studied enough.

In 23 of these states there is statutory provision that the state agency (usually the State Welfare Board) concerned with assistance to the blind can provide treatment, medical or surgical, for needy persons either to restore vision or to prevent blindness. It is of interest that one of the state agencies has already ruled that such treatment can only be given in a clinic or hospital approved by the American Hospital Association and the American College of Surgeons. The thought seems to be, where any thinking has occurred, that if clinic service is not available then such constructive work will be provided through arrangements made with those physicians who are on the list of qualified ophthalmologists. This matter of choosing and

designating qualified examiners is an important one. It is beginning to be realized that none of the methods described have worked very well. Many of the states are not yet aware of this weakness. Exception should be made of Maryland, of course.

The subject of classification of causes of blindness has presented itself. The Committee on Statistics of the Blind, organized about 1930 at the instigation of the Census Bureau, and under the auspices of the National Society for the Prevention of Blindness and the American Foundation for the Blind, has done considerable work in the field of classification of causes of blindness. It is believed that some useful purpose might be served in requiring state agencies interested in blind assistance to adopt this or some comparable classification. Some national statistical material would thus be possible on the subject of causes of blindness. It, also, might serve to awaken in each state some thought of preventive work.

Societies

The annual meeting of the Czechoslovakian Ophthalmological Society will be held the latter part of June, 1938, in Prague, at the time of the meeting of the All-Slavic Medical Society. The main theme will be "Diseases of the optic nerve and their treatment."

The Ophthalmological Society of São Paulo gave the following program at a recent meeting. Dr. Pereira Gomes presented an obituary of Dr. Ataliba Florence and the society passed a vote of regret for the death of Prof. J. Rollet. Dr. Jacques gave a short biography of Prof. de Lapersonne. Papers were read by Dr. A. Busacca and Dr. Benedito. The society's president is Dr. Aureliano Carlos da Fonseca; the secretary, Dr. Sousa Dias.

The following program of the Eye Section of the Philadelphia County Medical Society was given March 3, 1938, at the Philadelphia County Medical Society Building: Etiology and diagnosis of intraocular tumors, by Dr. William Zentmayer; Prognosis and treatment of intraocular tumors, by Dr. Alexander G. Fewell; Ocular roentgenologic diagnosis, by Dr. Edgar W. Spackman.

The Montreal Ophthalmological Society presented the following program on February 10, 1938: Dr. Byers, Dental cyst encroaching on the middle meatus, producing secondary conjunctivitis and keratitis; Dr. Amos, Fracture of the orbit and skull; Dr. Guertin and Dr. Monfette, Visual iridectomy for occlusio pupillae, secondary cataract; Dr. Tooke, A pterygium operation; Dr. MacMillan, Local metastasis in the orbit following sarcoma of the choroid; Dr. Rosenbaum, Marginal degeneration of the cornea; Dr. Alexander, Blue sclera; Dr. McMurtin, Spring catarrh.

The Guild of Prescription Opticians of America, Inc., announces the thirteenth annual convention to be held at the Waldorf-Astoria, New York, May 29 to June 1, 1938.

The following list of officers in the Los Angeles Society of Ophthalmology and Otolaryngology for 1938, were appointed: President, Dr. Clifford B. Walker; Vice-President, Dr. Leland G. Hunnicutt; Secretary-Treasurer, Dr. John P. Lordan; Committee-man, Dr. Sylvan S. Goldberg.

Personals

Dr. Algernon B. Reese, New York, presented a paper, Intraocular tumors, at the meeting of the Southeastern Surgical Congress, Louisville, Kentucky, March 7, 8, and 9, 1938.

Drs. Frank E. Burch and Edward P. Burch, 424 Hamm Building, St. Paul, Minnesota, announce the formation of a partnership for the practice of ophthalmology and ophthalmic surgery. Associates are Drs. Thomas J. Edwards and John J. Prendergast.

Dr. Park Lewis, 454 Franklin Street, Buffalo, New York, announces that he has associated with him in his practice Dr. Eliott Baldwin Hague, recently resident at the Institute of Ophthalmology of the Columbia Medical Center, New York City.

Dr. F. H. Haessler, Milwaukee, is taking over Dr. Zimmerman's work while he is away.

Prof. J. Meller has been made an honorary member of the Italian Ophthalmological Society.

On December 9, 1937, Prof. Salzmann celebrated his 75th birthday in Graz in perfect health and good spirits.

Dr. Marvin J. Blaess of Marshalltown, Iowa, was recently appointed attending ophthalmic surgeon to the staff of the newly enlarged Evangelical Deaconess Hospital, 3245 East Jefferson Avenue, Detroit, Michigan. Dr. Blaess will open his office in Detroit for the practice of ophthalmology on March 15th.

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EXHIBITS AND MOUNTED DISPLAYS:

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